April 20, 1942

STEEL

PUBLIC LIBRARY
APR 20 1942
DETROIT

PRODUCTION • PROCESSING • DISTRIBUTION • USE
IN TWO SECTIONS ESTABLISHED 1882 SECTION ONE

2300 VOLT STARTERS for

SYNCHRONOUS MOTORS
★
SQUIRREL-CAGE MOTORS

Completely Assembled Units with Built-in Short-circuit Protection

EC&M builds motor starters to suit the individual application. These views show a full-voltage, *completely automatic* starter for 2300 volt synchronous motor and a reduced-voltage, autotransformer starter for 2300 volt squirrel-cage motor.

Each is a totally enclosed unit with all internal wiring complete. The unit comes *ready to set in position.* It is only necessary to connect power and motor leads and wire the push button. This speeds installation and at the same time provides an attractive, shock-proof job.

Of special interest are the disconnect fuses giving short-circuit protection. These are selected with sufficient capacity to meet normal motor currents and also have sufficient rupturing capacity to meet the requirements of the power-feeder circuit. Motor protection is supplied by EC&M Type ZM Overload Relays which have a reputation throughout industry for accuracy and reliability.

For 2300 volt Motor Starter information, ask for Bulletins 1047-A and 1077.

Disconnect fuses are accessible through upper-door which is equipped with safety interlock. Overload Relays and Meters, when used, are mounted in middle section. Lower compartment, providing space for automatic field switching mechanism for synchronous motors, has ample space for bringing in cable, for mounting potheads, if desired, etc.

THE ELECTRIC CONTROLLER & MFG CO.
CLEVELAND OHIO

THE ELECTRIC CONTROLLER & MFG. CO. E&M CLEVELAND, OHIO

On shipboard and ashore, America's anti-aircraft guns are an essential part of the war effort. Keeping these hungry weapons of defense supplied with ammunition is a job calling for steel that must meet exacting specifications. Bethlehem Carbon Shell Steels are being supplied in large tonnages for the forged bodies of ack-ack shell in sizes for both the U. S. Army and U. S. Navy. In today's program for victory, all of Bethlehem's facilities are "on target" for maximum production of steel.

Bethlehem Carbon Bars

BETHLEHEM STEEL COMPANY

SHEARING ARMOR PLATE

on a Cincinnati

Armor plate is tough. Shearing it requires special application of machine . . . special knives.

Write for Recommendations on Your Job

THE CINCINNATI SHAPER CO.

SHAPERS · SHEARS · BRAKES

CINCINNATI, OHIO

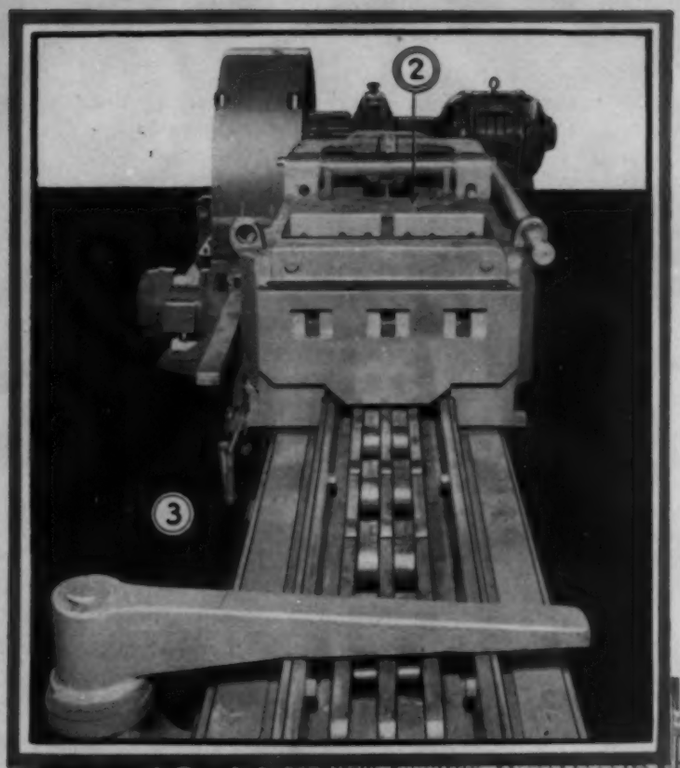
McKAY

BAR DRAWBENCHES

(WITH OR WITHOUT)

PUSH POINTERS

1. Hydraulic push pointer. (Insures lower maintenance cost).
2. Automatic wedge type grip-buggy for single and multiple draw with quick change feature.
3. Hydraulic or pneumatic throw-off arm.
4. Hi-speed automatic grip-return with slow pull-in feature.
5. Steel construction throughout.
6. Constant or variable speed drive.



Patent Applied For

THE McKAY MACHINE CO.

Engineers and Manufacturers of

SHEET, TIN AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

We also build: TUBE DRAWBENCHES, BAR SHEARS and ROTARY POINTERS

Behind the Scenes with STEEL

"L" Order On Craps

■ A loyal reader of this page is John R. Sutthoff, Manager, Lumbermen's Equipment Co., San Francisco and he apparently got as big a kick as we did out of this interoffice memorandum from the desk of Jim Thomas, Construction Superintendent of The Permanente Metals Corp. at Permanente, California. In sending it along Mr. Sutthoff comments facetiously that it appears to be quite unusual and is therefore a typical California product. The memo reads:

Because of the war, it has become necessary to freeze all crap shooting for the duration; the entire available supply being allocated to the military forces.

Accordingly, crap shooting on the premises of the Permanente Metals Corp. will be discontinued from this date, until further notice.

The writer regrets the curtailment of this great American pastime, having tossed many a scintillating "seven" during his career, but due to the fact that shift and lunch hours vary so widely, it is manifestly impossible to permit the continuance of this interesting custom.

Loofa, Luffa, Or Loofah

■ And speaking of restrictions, WPB last week ordered that an A-1-a preference rating is now required for the delivery of all *loofa sponges*.

That one stopped us, and in our eager search for knowledge we soon discovered that the loofa sponge is made from the fiber of the *luffa* or *loofah* plant which, of course, immediately cleared the whole thing up—or did it?

Actually this luffa plant has been grown almost exclusively on a commercial basis in Japan and is similar to the cucumber or squash. The sponge which is made from the fiber is unique for its property of oil absorption and is used extensively by the Navy. We don't quite get the connection but it is also used for inner soles of footwear, household cleaners and scrubbers.

To go right off the deep end, we might say that this war is now no *loofing* matter.

Dictator's Bridge

■ Most good bridge players, we've noticed, are also keen students of the international situation, all of which is one way to drag in this story we read in the new issue of the Armstrong Machine Works' interesting magazine.

The Nazi leaders were playing contract bridge in Hitler's mountain retreat.

"Three diamonds," said Goering.

"No bid," said Goebbels.

"Five diamonds," said von Ribbentrop.

"One club," said Hitler.

"Pass."

"Pass."

"Pass."

Posters Clicking

■ STEEL's series of posters, which continues this week with "You Are A Soldier of Industry" are now to be seen on many a factory bulletin board throughout the country. Letters, wires and phone calls continue to come in asking for extra copies and although the pile is going down there are still plenty left if you want some more.

Edward Bronstien of the United States Bedding Co., St. Paul, thought "Only More Will Win The War" was marvelous and wanted a dozen for their plant.

William Verity, Personnel Relations, American Rolling Mill Co. wanted 150 of "Ask Yourself" for all their various plants, and El Hollingsworth, Advertising Manager, Geo. D. Roper Corp., has wanted extra copies of all that have appeared so far, commenting that "they are using them to very splendid advantage in connection with shop bulletins".

Priorities Guide

■ That's just a quick idea of how people have liked the posters and we could go on for a couple of pages quoting letters but we also want to get a word in on the new Priorities Guide which you will find accompanying this issue. At least you should find it with the issue unless someone has pilfered it first—and that's exactly what has happened in hundreds of cases before.

For just that reason STEEL's Readers Service Department kept the presses running overtime and has a full supply of Priority Guides which are yours for the asking. They're free of charge if you want just a few but because of the demand we'll have to charge you a dime apiece for anything over a dozen. The address is Penton Bldg., Cleveland.

More Poetry

■ Earle E. Smith of Dallas, Texas says that one of their field engineers who read the poem here a couple of weeks ago, "Steel Is The Guts", saw an omission which is very important from his point of view. It is:

Steel is a pipe carrying water and oil,

Steel is a coffin when man ends his toil.

Something To Think About

■ John E. Wiley, V. P., Fuller & Smith & Ross Inc., New York, was speaking primarily of advertising—good advertising—when he made this statement, but its application goes into many fields today:

We let our guns rust when we were at peace.. Let's not let our machinery for peace rust while we are at war!

Vol. 110, No. 16. April 20, 1942. Issue of STEEL, published every Monday at Cleveland, O. Entered as second class matter at the postoffice, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00

Buy a Defense Bond—Today!

NO LONGER A

PUSH-OVER

FOR SUBS AND BOMBERS

No longer will U. S. Merchant vessels be a "sitting rabbit" for Axis submarines and bombing and torpedo planes. Now they will go to sea ready to fight back, carrying rapid-fire 20 millimeter guns that fire 450 explosive shells a minute! Great automobile plants have been tooled up for fast production of these guns. Batteries of Warner & Swaseys are taking off metal, turning the intricate and high-precision pieces that go into the gun's assembly.

Get More Production from New and Old Turret Lathes—perhaps we can show you how—write

Chambering cuts on the breech end of an anti-aircraft gun—an accurate operation at high speed production on a Warner & Swasey No. 1A.

WARNER & SWASEY
Turret Lathes
Cleveland

E

AWARDED FOR EXCELLENCE

Save Time and Money

here!

with Heppenstall Shear Knives

Heppenstall Shear Knives require less grinding and deliver more cuts to the grind because they are made of special analysis alloy steel in Heppenstall's own electric induction furnaces according to methods developed through more than fifty years of quality shear knife manufacture.

Without any obligation, Heppenstall Engineering Service will gladly help you solve shear knife problems. And next time you order, specify Heppenstall. Use knives whose guaranteed high quality save you time and money. Write for full information, Heppenstall Company, Box S5, 4620 Hatfield Street, Pittsburgh, Pennsylvania.

Heppenstall

PITTSBURGH · BRIDGEPORT · DETROIT

HEPPENSTALL H QUALITY

Forging Fine Steels For More Than Fifty Years

TUBING THAT WORKS LIKE THIS

helps speed

Production for Victory

● Today, more than ever before, the uniform workability of Republic ELECTRUNITE Tubing is a most important factor in the fabrication of items in our increasing needs of *Production for Victory.*

Guns, tanks, planes, ships and countless other items of armament—to say nothing of the thousands and thousands of products required to train our armed forces and equip them—must be produced in a hurry but without sacrifice of quality.

That's where the workability of ELECTRUNITE can help—wherever tubing is used in the manufacture of a product. The 50 cal. anti-aircraft machine gun shown above with body back rest and tripod legs of tubing is a good example.

ELECTRUNITE is electric resistance welded. Hence it possesses the uniformity of diameter, wall thickness, concentricity, strength, weight, ductility, close tolerance and scale-free surface which are obtainable consistently only through this process—features which increase ease of fabrication and help speed production.

If you're a tubing user, you should have all the facts about Republic ELECTRUNITE Tubing. Write us—today.

STEEL AND TUBES DIVISION
REPUBLIC STEEL CORPORATION
CLEVELAND • OHIO

Berger Manufacturing Division
Culvert Division • Niles Steel Products Division
Union Drawn Steel Division • Truscon Steel Company

Republic

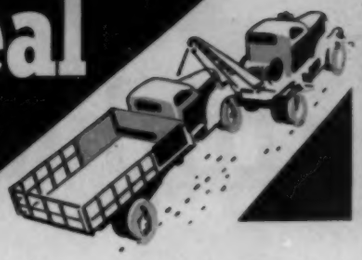
ELECTRUNITE

Reg. U. S. Pat. Off.

ELECTRIC RESISTANCE WELDED TUBING

Also Boiler Tubes • • • Condenser and Heat Exchanger Tubes

FOR THE Want of a Seal A TRUCK WAS LOST

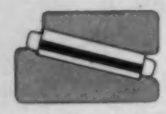


A job went unfinished for the want of a Truck. The Truck stopped short when its Rear Drive failed.

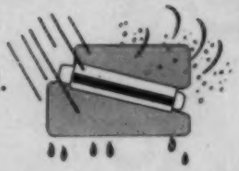
The Rear Drive failed when a Pinion Tooth broke.

The Tooth broke because of misalignment.

Alignment was lost due to excessive Bearing wear.



The Bearing wore out when grit and moisture entered.



COULD HAVE SAVED ALL THE TROUBLE at a negligible cost

by excluding

all foreign matter and keeping the lubricant within the bearing. Ask Chicago Rawhide Engineers

for their suggestions on applying "Perfect Oil Seals" to your equipment.

CHICAGO RAWHIDE MANUFACTURING COMPANY

PHILADELPHIA • CLEVELAND • NEW YORK • DETROIT • BOSTON • PITTSBURGH • CINCINNATI

52 Years Manufacturing Quality Mechanical Leather Goods Exclusively And Now Sirvene Synthetic Products

SAVE VITAL MAN-HOURS AND STRATEGIC METALS!

with Chromium Plating

16 PAGE BOOKLET

. . . describing the time-and-material-saving advantages of "hard" chromium plating warrants the interest of everyone concerned with the production or maintenance of metal products and equipment.

WRITE OR WIRE TODAY FOR BULLETIN 103

Today, chromium plating is utilized by many of the country's largest war production plants — making it possible for them to save vital man-hours and strategic metals . . . by extending the life of a wide variety of parts subject to wear and corrosion . . . by reclaiming many parts and tools which have been worn or machined off-size and would otherwise have to be scrapped.

By chromium plating forming dies, taps, and gauges, for example, they not only increase the life of these tools but also are able to recondition them when worn. This obviously means a saving in metal and labor that would otherwise be required in making new tools and is a valuable contribution to the war effort.

Equally important, this wear-and-corrosion-resistant finish is being used to reclaim worn parts for which replacements would be difficult or impossible to get. And in production, parts machined or ground off-size are being salvaged by "hard" chromium plating the important surfaces — conserving the metal and man-hours of skilled labor represented in each finished piece.

Chromium plating is not a "cure-all" but where properly used, it is a proven means of saving time, labor and materials. It may be the answer to one of your problems. To help you investigate, we have prepared this 16 page booklet that tells how other plants are utilizing chromium plating . . . that points the way to similar opportunities in your plant. Your request brings it by return mail.

UNITED CHROMIUM
INCORPORATED

Main Office: 51 East 42nd Street, New York, N. Y.

DoAll* meets the Challenge

This remarkable Contour Machine is speeding along the steady flow of vital equipment for army, navy and air force by doing a lion's share of cutting tough metal and alloy parts of every description in airplane plants, arsenals, shipyards, etc.

On hundreds of production jobs, DoAll is doing a week's work in a day, a day's work in an hour, an hour's machining in 10 minutes.

DoAlls range in price from $1,000 to $5,000 complete with necessary equipment; yet are relieving $10,000 to $50,000 machine tools of over-load work with valuable savings of time and metal.

AIRPLANE SKIS

Made on the DoAll. Operator is cutting 12 pieces of .0125—24 S.T. Duralumin at the same time. A single ski has 24 separate cuts. Formerly cutting was done, one at a time with large hand shears.

DoAll Contour Sawing
BAND SAWING
BAND FILING
BAND POLISHING

* Fastest production method of removing metal

CONTINENTAL

Associated with the DoAll Company, Des Plaines, Ill.
Manufacturers of Band Saws and Band Files for DoAll Contour Machines

for faster PRODUCTION

Keep the planes, ships and bombers coming! That's the demand on American industry today. Every ounce of energy, every improved method to increase output must be used.

NOW... AND WHEN PEACE COMES

Whether you are doing war work on direct or sub-contract, you need the DoAll—the most versatile machine for production.

And—when the war is over, the DoAll won't have to be scrapped, but can be put to immediate work on your shelved peace-time orders without changing a single nut or bolt.

Available are 42 different sizes and styles of band saws, 23 band files, 3 polishers, a "best" one for every kind of work.

Let us send a factory trained man to show you just what the DoAll can do for you now and later.

AGITATOR MOLD

At Emmett Mold, Inc., this Washing Machine Agitator Mold was made in 13½ hours on the DoAll. Material is Chrome-Vanadium Steel 10" thick, 18" diam. weighing 720 pounds.

HAMMER DIE

At American Fork & Hoe Co., this 10" thick Hardten Tool Steel Forging Die to make hammers was cut on the DoAll. Saving was about 60% in time and a great amount of metal over any other method.

AIR-CONDITIONING DUCTS

At Char-Gale Mfg. Co., 50 parts are cut at a time from 30-gauge galvanized iron. Operator can cut 1000 or more parts a day, which is 3 to 4 times faster than the old method, one at a time with hand tinsnips—and a much neater job.

MACHINES, INC.

1324 S. Washington Ave., Minneapolis, Minn.

NEW
Send for the interesting and helpful book "DoAll on Production"

DoAll
Contour Sawing
BAND SAWING
BAND FILING
BAND POLISHING

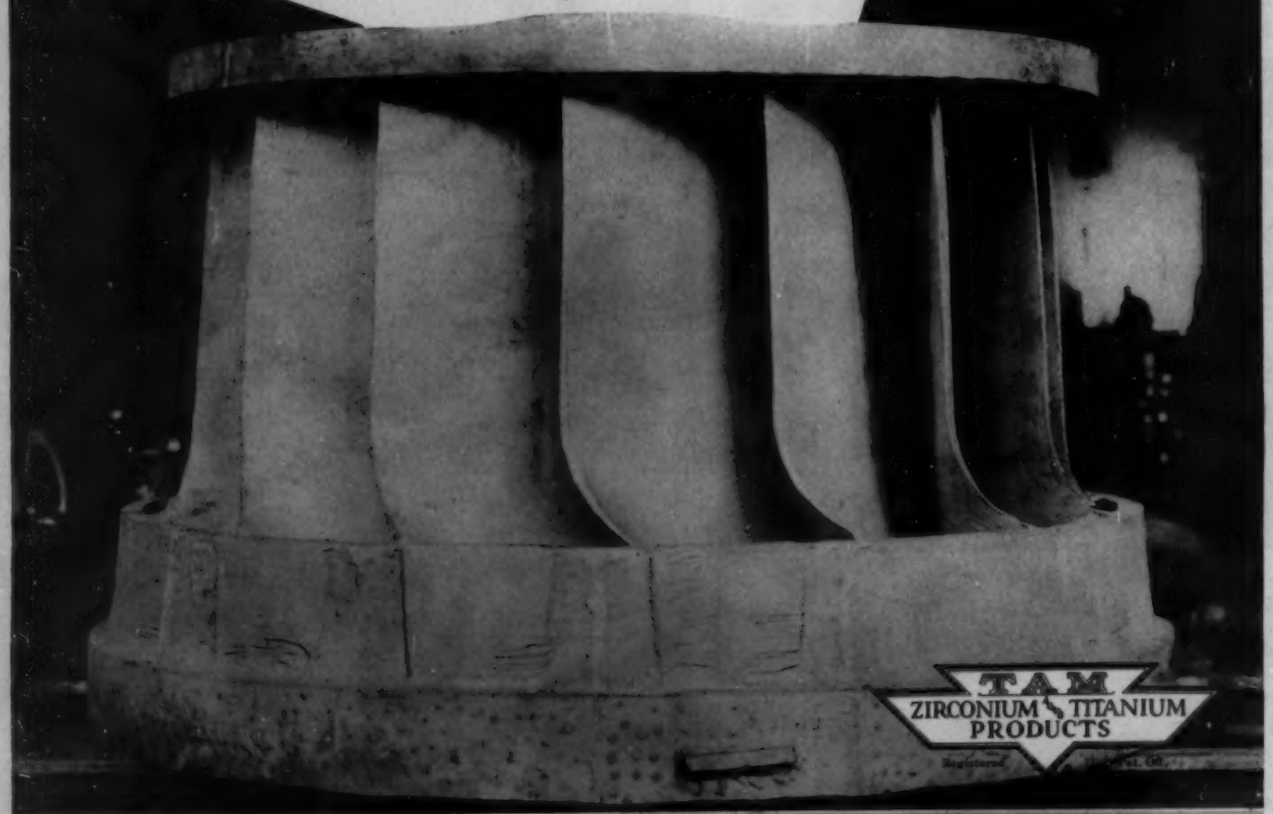
SMOOTH FACES FOR CASTINGS

TAM Zirconite super-refractory mold and core washes produce smoother surfaces and reduce cleaning costs

By resisting the burning-in of the molten metal, TAM Zirconite Mold and Core washes speed up output of good castings by reducing the number and time of cleaning and finishing operations. Available in three grades: Zirconite A has a melting point above 3775° F.; Zirconite B has a melting point above 3600° F.; and Zirconite C, for special uses, has a melting point above 3600° F. They are quickly mixed by adding to water, and can be applied by either spraying, swabbing or painting on cores and molds. Write for complete details, today.

TITANIUM ALLOY MANUFACTURING COMPANY

Zirconite Wash was used on this 94,000 pound .30-.35 carbon steel casting—11'6" high 14' diameter. Of special interest is the fact that no nails were used in the facing.



GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY

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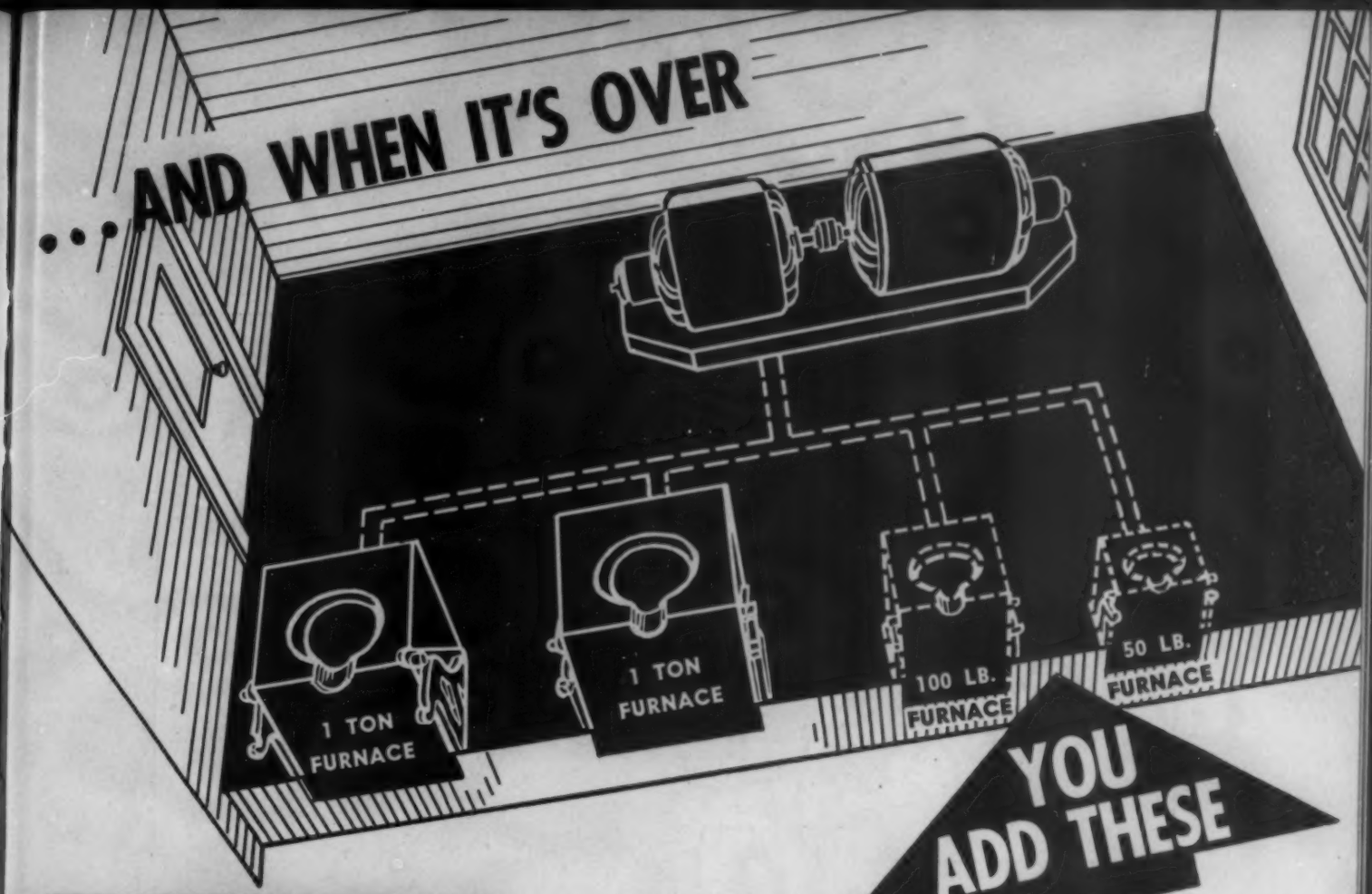
Representatives for Canada . RAILWAY & POWER ENG. CORP., Ltd., Toronto, Montreal, Hamilton, Winnipeg, Vancouver, Sydney
Representatives for Europe . . . . . T. ROWLANDS & CO., Ltd., 23-27 Broomhall St., Sheffield, England

...AND WHEN IT'S OVER



YOU ADD THESE

Typical installation of Ajax-Northrup High Frequency Furnace with a capacity of 1,000 lbs. per hour.

Today thousands of tons of a single analysis of alloy steel may be required on a rush basis. The layout above shows two Ajax-Northrup furnaces that will turn out a ton each per hour—for the duration. No variation in output, practically no loss of elements, no uncomfortable heat. Just top speed and quality at the lowest possible cost.

But what of tomorrow? How will this plant meet normal requirements later on?

There are a dozen answers to this question. It is easy to change from one analysis to another. It is economical to make a half or a quarter charge, in the larger furnace. It costs little to add several smaller units, running down even to sizes suitable for multiple tests or pilot plant operation. No waiting for orders to accumulate. No excess inventory left over. And the demand for experimental heats can be met quickly, at low cost.

Or a battery of brazing coils, heaters for forming or forging may be substituted at any time.

High frequency equipment is the practical way to meet the emergency and prepare for peace.

48

AJAX HIGH FREQUENCY FURNACES

NORTHRUP AJAX ELECTROTHERMIC CORPORATION, AJAX PARK, TRENTON, N.J.

ASSOCIATE COMPANIES: THE AJAX METAL CO. *Non-Ferrous Ingot Metal for foundry use.*
AJAX ELECTRIC FURNACE CORPORATION. *Ajax-Wyatt Induction Furnaces for melting.*
AJAX ELECTRIC CO., Inc. *Ajax-Hultgren Salt Bath Furnace and Resistance Type Electric Furnaces.*

FRUEHAUF TRAILERS

reduce deadweight . . . increase payloads

built with **N-A-X**

High Tensile

DUCTILITY

ITS INHERENTLY FINER GRAIN MAKES ALL THE DIFFERENCE

STRENGTH

It is easy to see how the Fruehauf Trailer Company, world's largest builder of truck-trailers, provides its customers with more economical transportation units. The cut-away illustration, above, of the trailer unit shows clearly how deadweight has been removed, thus increasing the payload of each trip. Yet with this lighter type of construction, *ample strength has been provided.*

To make possible the lightweight but strong design, Fruehauf uses N-A-X HIGH TENSILE steel for the structural members of their truck-trailers.

Because N-A-X HIGH TENSILE can be fabricated by all standard shop methods—in most cases no "change over" is required—it goes through each step in cold forming, drawing and welding with ease and speed. The easy workability of N-A-X HIGH TENSILE makes for speedy low-cost fabrication.

Because of the unusual properties of this low alloy steel, finished equipment has greater resistance to the destructive forces of *stress*, *shocks* and *fatigue*, in both extremely hot and sub-zero weather.

A Great Lakes engineer will be glad to call in person, give you the benefit of wide-spread experience in the use of N-A-X HIGH TENSILE in hundreds of exacting applications. Telephone, wire or write for one today.

Send for Booklet on our N-A-X 9100 Series—the Versatile Alloy Steel

LIST OF PRODUCTS

Hot Rolled Strip (down to 1 inch wide) . . . Hot Rolled Strip Sheets (up to 91 inches wide) . . . Spring Steel (carbon and alloy) . . . Merchant Bars . . . Forging Bars . . . Automobile Bumper Sections . . . Bar Mill Sections . . . N-A-X HIGH TENSILE Bars, Shapes, Sheets, Billets . . . Sheet Bars . . . Hot and Cold Rolled Sheets . . . Michigan Metal for Vitreous Enameling . . . Deep Drawing Quality (in all grades, widths up to 91 ins.) . . . Stran-Steel Metal Framing for Residential and Commercial Construction.

GREAT LAKES STEEL CORPORATION—DETROIT, MICHIGAN

Sales Offices in Principal Cities

division of NATIONAL STEEL CORPORATION

Executive Offices, Pittsburgh, Pa.

SWINDELL FURNACES IN FOUR WARS have made METAL FOR VICTORY!

today

. . . modern Swindell Electric Furnaces such as this are speeding production of fine steels for better implements of war—as faithfully and effectively as Swindell products have served since the simple iron furnaces of ninety years ago.

Present-day Swindell design, saving *time and labor* with swinging roof for rapid top-charging, features exclusive integrated construction which assures smooth performance under capacity-plus demands.

SWINDELL-DRESSLER *Corporation*

DESIGNERS AND BUILDERS OF MODERN INDUSTRIAL FURNACES

PITTSBURGH, PA.

What Pickling Departments are doing to help

CONSERVE MONEL

After years of service this strategic metal is being re-fabricated into re-designed equipment

With wartime demands consuming all the Monel that can be produced, it is more important than ever to get maximum use out of this Nickel Alloy.

Many users are now taking advantage of the fact that even after years of service in pickling acids, Monel is still sound, and is readily fabricated and welded.

Sometimes old Monel equipment can be re-designed. The crates illustrated are a good example. Though eight years old, they were rebuilt and enlarged to fit new requirements.

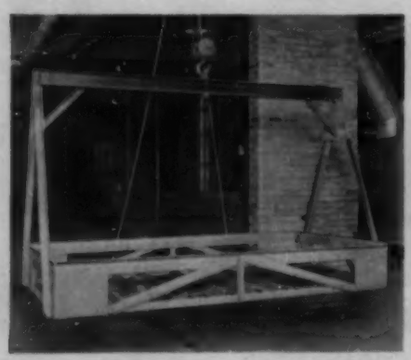
In other mills, the threaded ends are cut off old tie-rods, which are then re-threaded for use on smaller tanks. Some pieces are used for separator pins. The smaller tie-rods in turn are *again* cut up and used for still other parts.

If *you* have any old Monel equipment that you'd thought of discarding, take another look at it. Maybe you can re-fabricate it . . . and thus get further use out of this war-important material.

★ ★ ★

FIRST THINGS FIRST – With the Nation at war, supplies of Monel, Nickel and Nickel Alloys are needed for our armed forces. All efforts must now be aimed toward victory. In the meantime The International Nickel Company will continue to issue information which it is believed will be of interest to metal users who are concerned with the war needs of today and the peace-time progress of the future.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.



← **ORIGINAL CRATE:** the user of this Monel crate built in 1934 needed longer and deeper units, and found no difficulty in converting it to meet new requirements.

★ ★ ★

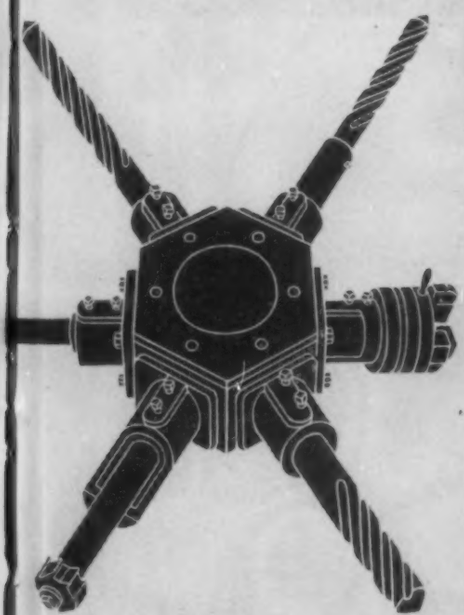
REBUILT UNIT: One of a number of new crates made from parts of the old ones that had seen 8 years of service. →

★ ★ ★ ★ ★ **INCO NICKEL ALLOYS** ★ ★ ★ ★ ★

MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • NICKEL • "Z" NICKEL

Sheet . . . Strip . . . Rod . . . Tubing . . . Wire . . . Castings

Why this extreme rigidity
IN GISHOLT TURRET LATHE DESIGN?



Where machining calls for precision, there's no substitute for the extreme rigidity found in Gisholt turret lathes. Heavy bed and headstock are cast as a single piece with headstock walls extending well above the spindle. Heavy cross-ribbing assures rigid support for shaftbearing seats. Hardened steel bed ways, securely anchored, are ground in perfect alignment with the spindle.

By eliminating the causes of vibration, Gisholt construction enables you to take the heaviest cuts without chatter—to hold precision at higher cutting speeds.

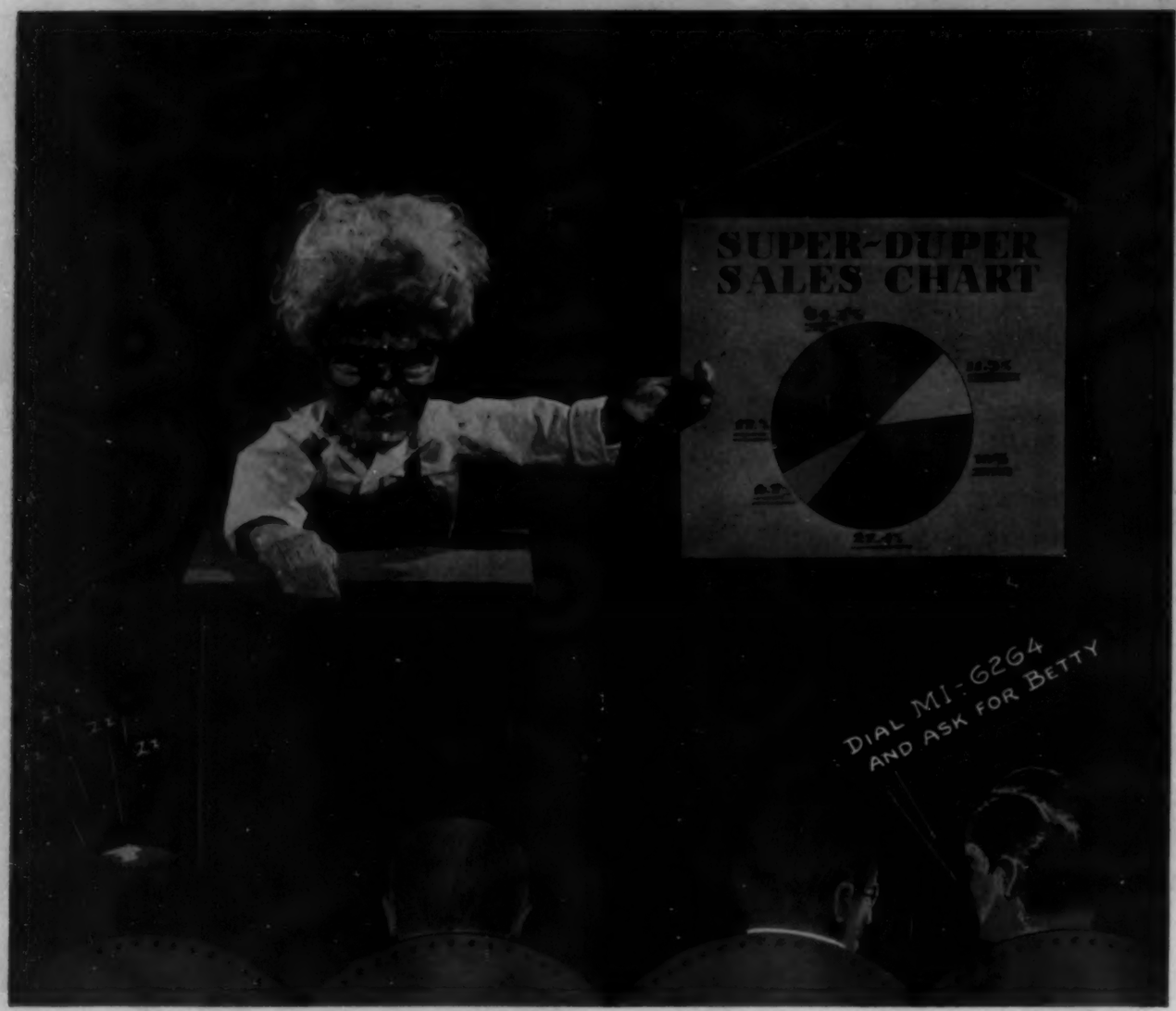
"Gisholt for accuracy" is no mere catch phrase. Behind it is more than a half century of successful turret lathe building.

GISHOLT MACHINE COMPANY
1217 East Washington Avenue • Madison, Wisconsin

GISHOLT

LOOK AHEAD—KEEP AHEAD—WITH GISHOLT IMPROVEMENTS IN METAL TURNING

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES



WHITEY SEZ: *"THE SPEAKER WHO EXHAUSTS HIS SUBJECT FREQUENTLY DELIVERS THE SAME BLOW TO HIS AUDIENCE...THUS DO WE CONTROL OUR LINE AS CAREFULLY AS WE DO OUR PRODUCT."*

MAURATH, Inc.
Builder of better welding

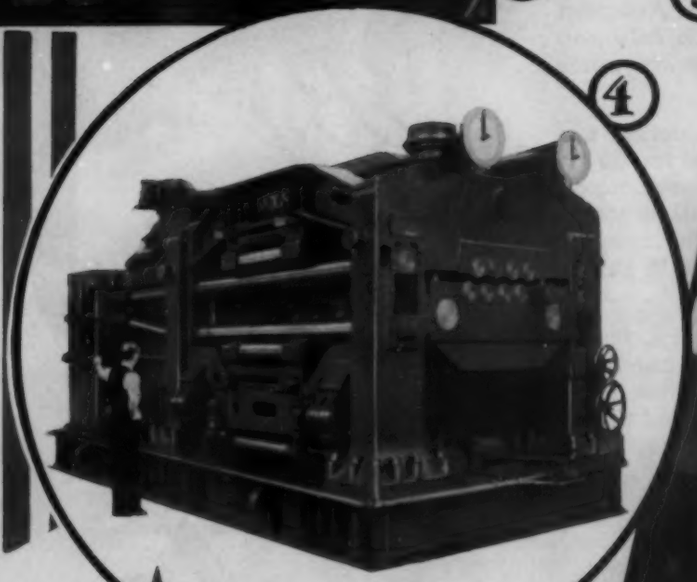
CLEVELAND
electrodes in all analyses

CANADA *Speeds Production* *with* WEAN

WEAN EQUIPMENT FOR OFFENSE

WEAN EQUIPMENT

1. Wean-Hallden Hi-Speed Tin Plate Shearing Line.
2. Wean Cone Type Hydraulic Uncoiler.
3. Wean Quick Adjusting Side Trimmer.
4. Wean Heavy Duty Roller Leveller For Armor and Ship Plate.
5. 5 Wean Automatic Hi-Speed Tin Plate Coating Lines.



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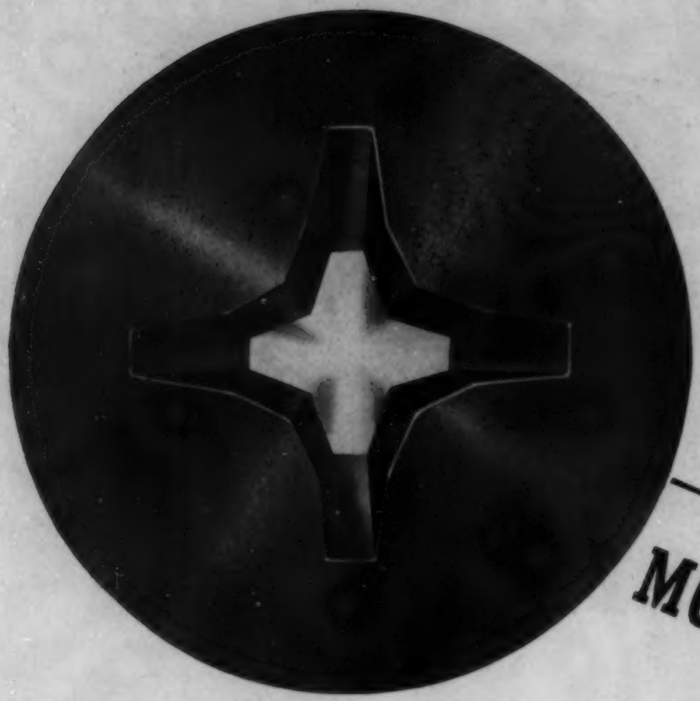
WARREN, OHIO

SUBSIDIARY COMPANY

THE BRODEN CONSTRUCTION CO., CLEVELAND, O.

Mfgrs. of Strip and Wire Mill Machinery

PRODUCTS:
Armor Plate Levellers . . . Shell Lathes . . . Airplane Motor Sleeve Lathes . . . Bomb Shelters . . . Tinning and Galvanizing Equipment for Light Coatings . . . Annealing Equipment for Rifle Clip Stock.



MULTIPLYING A MONEY-SAVING PLUS

By 3

America's leading firms write "American Plus" in front of "Phillips" on their orders . . . to get "3 Plusses" with every recessed head screw

American's Engineering. The engineers who first helped to develop the patented Phillips Recess have naturally led the way in helping screw-using industries save millions of dollars . . . by applying this great advance in screw design to countless assembly lines. American Screw Company engineers are available to help *you* affect similar time-and-motion savings . . . savings which cut unit-assembly costs an average of 50%.

American's Quality Control. Both raw materials and methods of manufacture pass under constant scrutiny in American Screw Company's chemical and metallurgical laboratories. Testing machines . . . for metal structure, torque, vibration, shear, etc. . . . insure the complete reliability of every shipment of American PLUS Phillips Screws.

American's Inspection Methods. There are few, if any, parallels in the screw industry for American Screw Company's unique system of piece inspection which watches every single screw for defects . . . and permits no single package to leave the plant without its full complement of screws.

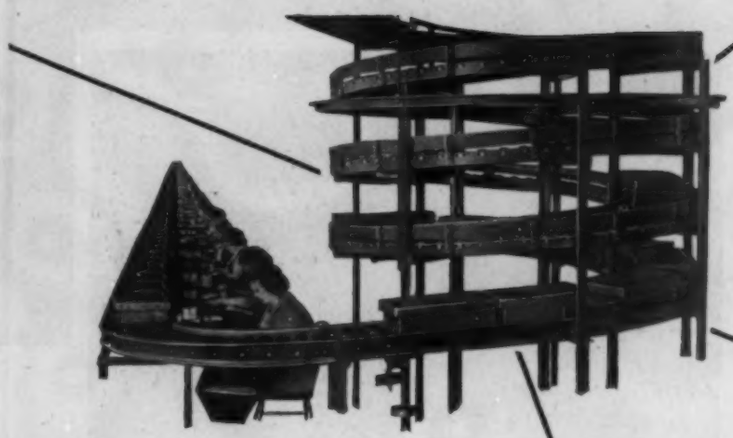
Multiplying distributors to meet multiplied demand. The "3 Plusses" are 3 good reasons why America's leading manufacturers have multiplied their demand for American PLUS Phillips Screws . . . and also why more and more mill supply distributors are prepared to meet their increased demands — and *yours* — right now!

AMERICAN SCREW COMPANY

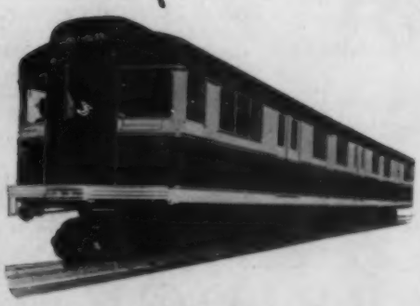
Chicago, Ill. 589 E. Illinois St.
Providence, R. I.
Detroit, Mich. 1847 W. Bethune St.

AMERICAN PRODUCED THE PLUS . . .
THE PLUS IS PRODUCING FOR AMERICA

You'll find American PLUS Phillips Screws in the cab construction of Brockway Trucks.



Special friction spring screws used in Guiberson Tubing Catcher eliminated "shearing off" trouble experienced with other screws.



American PLUS Phillips Screws on the Coney Island Express — equipped by Clark Equipment Company.

BUILT ON A HORIZONTAL CURVE!

Antler Bridge over Sacramento Canyon offers interesting features of design.

The Antler Bridge, built jointly by the U. S. Bureau of Reclamation and the State of California, was designed and constructed under the direction of the State Highway Engineers. The United Concrete Pipe Corporation was the General Contractor.

PERHAPS the major project in the relocation of approximately 16 miles of state highway, made necessary by the construction of Shasta Dam, is the Antler Bridge.

It spans the Sacramento River Canyon, at Antler, California, some 18 miles above the site of Shasta Dam.

This is an impressive 1330-foot deck structure carrying a 50-foot, 4-lane concrete roadway flanked by 2½-foot sidewalks. The roadway is built on a vertical grade descending northwardly. It sweeps across the canyon on a horizontal curve of 850-foot radius. Its lines are pleasingly symmetrical.

Of the six supporting concrete piers, the tallest rises 172 feet above its footing. The highest point of the roadway deck is some 210 feet above the low water of the Sacramento. However, upon the completion of Shasta Dam, the backed-up waters will come to within 80 feet of the highest point—practically leveling-off with the tops of the piers at the low end of the structure.

ROADWAY VIEW AND ELEVATION OF THE ANTLER BRIDGE. The impounded waters of Shasta Dam eventually will rise to the approximate level of the concrete pier-tops, inundating the Sacramento river valley.

The steel superstructure, excepting for short beam approach spans at either end, is a symmetrical arrangement of 5 truss spans: two of 189 ft., two of 252 ft., and a central span of 273 ft. The 189-ft. and 252-ft. spans are grouped into two continuous units. Each unit cantilevers 63 feet beyond the central piers to support the 147-ft. suspended truss of the 273-ft. central span; also cantilevers 42 feet beyond the end piers to carry the beam span approaches. Of unusual interest is the truss design which utilized throughout CB Sections for component members—replacing the conventional laced and plated assemblies.

American Bridge Company, as sub-contractor to Columbia Steel Company, fabricated and erected the approximately 1700 tons of steel which entered into this construction.

AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

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Duluth · Minneapolis · New York · Philadelphia · St. Louis

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

UNITED STATES STEEL

Have you the qualities of our products

AT YOUR FINGER'S END?

SEYMOUR PLATERS' ACCESSORIES **5**

SEYMOUR NICKEL SILVER **1**

SEYMOUR PHOSPHOR BRONZE **2**

SEYMOUR NICKEL ANODES **3**

SEYMOUR BRIGHT NICKEL **4**

SINCE the Emergency, "Seymour" has shipped Defense plants thousands of tons of non-ferrous alloys, anodes and plating equipment. To get the most out of these products, many customers use the free services offered by our laboratories. Doubtless, many more would be benefited by a better knowledge of the properties of the "Seymour" products they are using. Following reminder information may help:

1. SEYMOUR NICKEL SILVER is an alloy of copper, nickel and zinc. Fine grain, good corrosion resistance and a silvery white color make it the ideal base for silver, nickel and chromium plating. Takes any hardness from dead soft to spring temper. Excellent for deep draws and difficult spinning. Leaded, it machines freely.

2. SEYMOUR PHOSPHOR BRONZE is an alloy of copper, tin and phosphorus. Highly resistant to corrosion, abrasion, friction and fatigue. Springs made of it stand almost indefinite flexure. Practically indifferent to thermal change in most applications. In all ranges of hardness and leaded for machining.

3. SEYMOUR NICKEL ANODES are made of virgin nickel, melted in the electric furnace under pyrometric control and laboratory check. Outstanding is the "Seycast" 99%+ cast nickel anode with radial "anchored" grains that tend to eliminate loose nickel in low pH baths. Designed primarily for Bright Nickel, but will give excellent results in any hot Watts bath having a pH of 4.5 (electrometric) or lower.

4. SEYMOUR BRIGHT NICKEL is an organic plating process free from promoter metal, stable, easily controlled. Utilizes the hot Watts bath and produces brilliant, silvery white deposits over copper and brass, also direct on steel. No coloring required after plating. The work leaves the final rinse with a bright deposit.

Glad to furnish details and laboratory service on any product without obligation.

SEYMOUR

NON-FERROUS ALLOYS SINCE 1878

THE SEYMOUR MANUFACTURING CO.

SEYMOUR, CONN.

Purring like a kitten today—
BUT RUST MAY STRIKE TOMORROW!
Right now rust can be working on the delicate governor mechanisms of your turbines . . . then without warning—trouble! To help prevent costly shutdowns and overhauls change over your turbines to *new* Shell Turbo Oil—it can prevent rust! The first turbine oil to meet all 3 vital requirements of modern turbine lubrication, it offers
RUST PREVENTION
SUPERIOR OXIDATION STABILITY
MINIMUM FOAMING TENDENCY
Why accept less? Call in Shell today!
Keep YOUR turbines humming with
SHELL TURBO OIL
SHELL

Machinability in cast iron

**"Arms of the best quality—and plenty of them.
Step up the speed—to the maximum.
But remember the tools. The tools are priceless.
Make the most of them."**

For higher cutting speed plus longer tool life, improve your machinability. But how do you improve machinability in cast iron?

It's mostly a matter of structure — uniformity of structure and elimination of hard edges. For example, a casting of 179 Brinell may have edges of 500 Brinell due to chilling. Another casting from the same pattern may have an overall hardness of 217 and machine much easier.

Then again, the trouble may be internal spots of ferrite or even massive carbides which hamper machining.

V-5 and V-7 Alloys reduce and stabilize chill depth and, by eliminating chilled edges, improve machinability. V-Alloys also promote uniformity of structure — pearlitic throughout — excellent for machining.

Result — either maximum rate of metal removal, or maximum tool life for the selected depth and speed of cut.

VANADIUM

CORPORATION OF AMERICA · NEW YORK, N. Y.

FERRO-ALLOYS

NO PRIORITIES OR SHORTAGES

AFFECT THIS OFFER

Can we give you a hand with your steel problems? If you're working on war production, our experience and full cooperation in helping you use steel more effectively is available *right now* — and with no strings attached.

The steel engineers and metallurgists we have assigned to this important job of getting the most out of steel can bring to the solution of your problems the very latest ideas and time-saving techniques in the working and treatment of steel.

In helping you smooth out the difficulties inseparable with the switch-over to war-time production, these men can call upon the facilities of the most completely equipped steel research laboratories and the largest steel-making plants in America. They can clearly interpret your needs to our steel makers to assure the most prompt and efficient action. Their assistance is eminently practical.

The task that war has set America means that you've got to learn in a hurry —and you've got to achieve production with the means at hand. These men will help you do both.

Their services are available to every user of Carnegie-Illinois Steels engaged in the manufacture of war equipment.

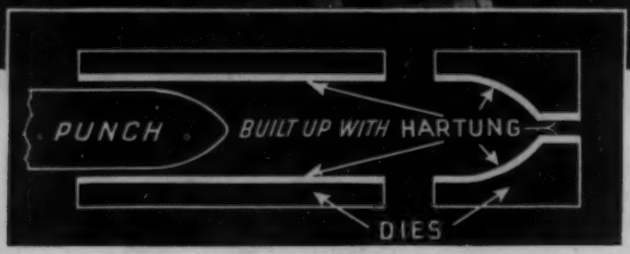
CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

UNITED STATES STEEL

HOW P&H "HARTUNG" HELPS MAKE SHELLS



Used to Hard-Surface Forming Dies

IN the forging process used to make shells for these 75 mm., 90 mm., and 105 mm. guns, steel bars are passed through a series of dies to form the outer surface of the shell. A punch or piercing die forms the inner cavity — as shown by sketch at right.

For hard-surfacing these dies, P&H "Hartung" has been extremely successful. After the "build-up" with this tungsten molybdenum electrode, dies are heat-treated at 1250° F. This reduces their hardness to 45-50 Rockwell "C", making the surface machineable with Carboloy tools. The deposited metal, free from pin holes, assures smoother finish, reduces wear and materially increases die life.

P&H "Hartung" is also widely used for building up tool steels. With air hardening properties in excess of 60 Rockwell "C", it maintains a durable cutting edge. It is but one of the complete line of P&H Alloy Electrodes. Write for full information.

P&H FOR ALLOY ELECTRODES

P&H-HANSEN SQUARE FRAME WELDERS *give you easier, more accurate current control with one simple adjustment whether machines are used singly or hooked up in parallel, to meet every welding need. . . . Write for Bulletin W-28.*

General Offices: 4411 West National Avenue . . . Milwaukee, Wisconsin

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WELDING ELECTRODES • MOTORS • HOISTS P&H ELECTRIC CRANES • ARC WELDERS • EXCAVATORS

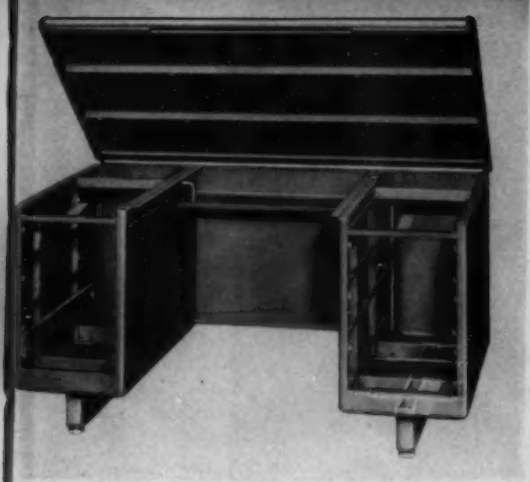
THE LARGEST PRESS

at the

ART METAL CONSTRUCTION COMPANY

Jamestown, N. Y.

Steelweld Model M4-8 Bending Press. One of four Steelwelds at the Art Metal Construction Co.



Many parts for ART METAL AIRLINE DESKS are made quickly and accurately on Steelweld Bending Presses.

Of the many presses at the Art Metal Construction Co., the Steelweld Model M4-8 is the newest and largest. This machine forms parts for Art Metal steel desks, filing equipment, shelving, etc. It was purchased because of satisfactory performance of three other Steelweld Presses at Art Metal and because of features exclusive in Steelwelds which have proven advantageous.

The operator who has had years of experience on various presses says, "This Steelweld handles easier. Very little effort is required. The ram can be stopped within 1/64 inch."

Art Metal executives appreciate particularly the very little maintenance Steelwelds require. For instance, brake linings which must be replaced every six weeks to two months on some machines are practically a forgotten item on Steelwelds.

Steelweld Presses produce straight accurate bends necessary for Art Metal office equipment. They are versatile, permitting a wide variety of work. In a few minutes dies used for making shelving parts can be replaced with dies for desk parts. Gauges and indicators make it a simple matter to obtain identical results repeatedly with a set of dies.

GET THIS BOOK!

CATALOG No. 2002 gives complete construction and engineering details. Mail request for free copy on your company letterhead.

THE CLEVELAND CRANE & ENGINEERING CO.
STEELWELD MACHINERY DIVISION
1125 EAST 283RD STREET • WICKLIFFE, OHIO.

MANUFACTURERS OF • CLEVELAND CRANES • CLEVELAND TRAMRAIL • STEELWELD BENDING PRESSES

STEELWELD
BENDING PRESSES

GENERAL SALES AGENTS: CYRIL BATH & CO., E. 70TH & MACHINERY AVE., CLEVELAND

LEWIS

Up and Down cut SHEAR

LEAVES THE SLAB STRAIGHT AND TRUE AFTER CROPPING

This new 1350-ton Lewis Heavy Duty Cold Slab Shear is saving time on the Victory Program.

LEADING FEATURES

This shear is designed to crop 3" x 25" slabs. Both upper and lower knives function in vertical slides eliminating oscillation of the main cutting frame and assuring a true cut and straight slab after cropping.

The upper shearing head is equipped with an automatic hydraulic holddown. Due to the action of both knives meeting on the center line of material flow, no tilting tables are necessary.

The shear drive is completely enclosed in oil and dust tight cases and is driven by a 75 HP flywheel drive.

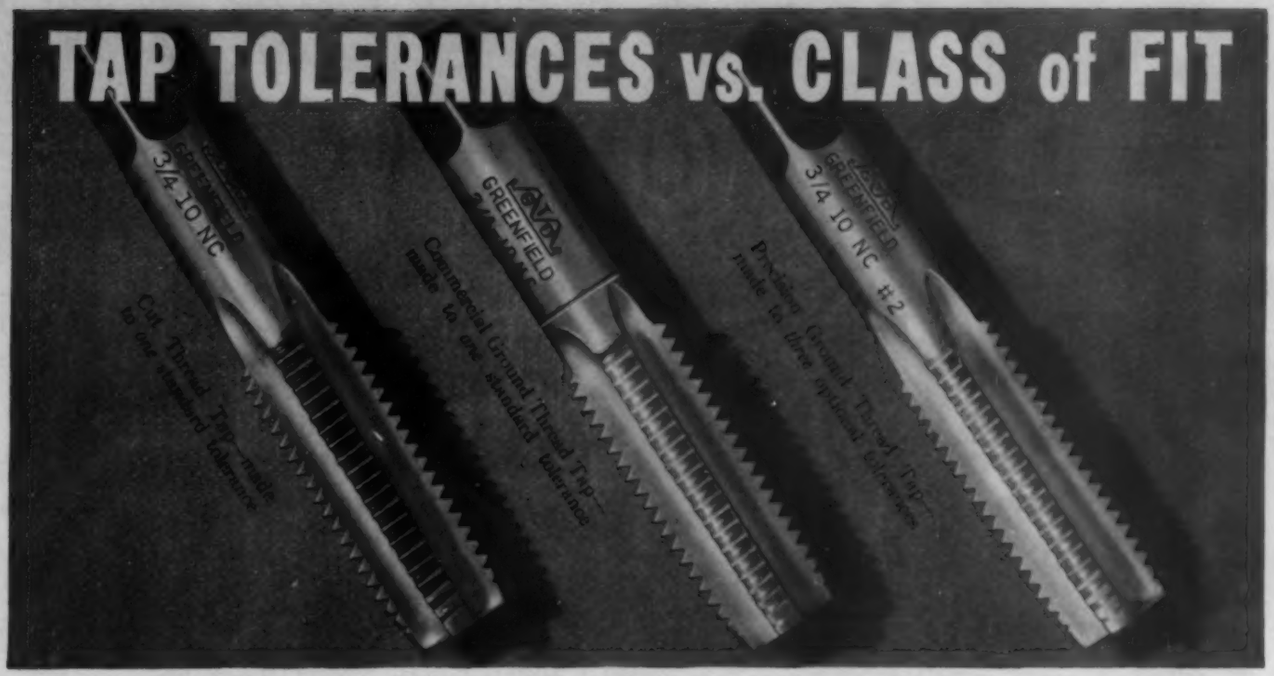
The clutch is actuated through a thrustor and push button control.

The gear case is equipped with marine lighting and heavy plate glass vision ports for extreme visibility.

LEWIS
Rolls and Rolling Mill Machinery step up tonnage

LEWIS FOUNDRY & MACHINE
DIVISION OF BLAW-KNOX CO.
PITTSBURGH, PA.

TAP TOLERANCES vs. CLASS of FIT


3/4-10 NC
Cut Thread Tap—made to one standard tolerance
GREENFIELD
Commercial Ground Thread Tap—made to one standard tolerance
3/4 10 NC #2
Precision Ground Thread Tap—made to three optional tolerances

A common source of confusion in tapping is failure to distinguish between CLASS of FIT as applied to the PRODUCT, and PITCH DIAMETER LIMITS as applied to PRECISION GROUND THREAD TAPS. The cause of this confusion doubtless is the fact that both terms involve the use of a similar, but not identical, series of numbers, and that the corresponding numbers have no direct relationship.

CLASS of Work FITS or "Screw Thread Assemblies" are:

No. 1—"Loose" No. 2—"Free"
No. 3—"Medium" No. 4—"Close"

Optional Pitch Diameter LIMITS or TOLERANCES of Precision Ground Thread Taps are: No. 01, No. 1, No. 2.

The table at the right indicates the taps which normally will produce Class 2 and 3 Fits, the ones most commonly used. Ordinarily, when using Precision Ground Thread Taps it is best to determine what screw assembly fit is required, then the Tap to produce threads for that fit may be selected by trial from the optional tolerances available.

Size	Threads per Inch			Class	
	NC	NF	NS	2	3
¼	20	..	..	Cut	CG
..	..	28	..	Cut	PG 2
5/16	18	..	..	Cut	CG
..	..	24	..	Cut	PG 2
⅜	16	..	..	Cut	CG
..	..	24	..	Cut	PG 2
7/16	14	..	..	Cut	CG
..	..	20	..	Cut	CG
½	13	..	..	Cut	CG
..	..	20	..	Cut	CG
9/16	12	..	..	Cut	CG
..	..	18	..	Cut	CG
⅝	11	..	..	Cut	CG
..	..	18	..	Cut	CG
11/16	..	..	11	Cut	CG
..	..	..	16	Cut	CG
¾	10	..	..	Cut	CG
..	..	16	..	Cut	CG
⅞	9	..	..	Cut	CG
..	..	14	..	CG	CG
..	..	..	18	CG	CG
1	8	..	..	Cut	CG
..	..	14	..	CG	CG
1 1/8	7	..	..	Cut	CG
..	..	12	..	CG	CG
1 ¼	7	..	..	Cut	CG
..	..	12	..	CG	CG
1 3/8	6	..	..	Cut	CG
..	..	12	..	CG	CG
1 ½	6	..	..	Cut	CG
..	..	12	..	CG	CG

Size	Threads per Inch			Class	
	NC	NF	NS	2	3
0	..	80	..	PG 1	PG 1
1	64	..	..	PG 1	PG 1
..	..	72	..	PG 1	PG 1
..	..	..	56	PG 1	PG 1
2	56	..	..	PG 1	PG 1
..	..	64	..	PG 1	PG 1
3	48	..	..	CG	PG 1
..	..	56	..	CG	PG 1
4	40	..	..	CG	PG 1
..	..	48	..	CG	PG 1
..	..	..	36	CG	PG 1
5	40	..	..	CG	PG 1
..	..	44	..	CG	PG 1
6	32	..	..	CG	PG 1
..	..	40	..	CG	PG 1
8	32	..	..	CG	PG 1
..	..	36	..		PG 1
10	24	..	..		PG 1
..	..	32	..	Cut	PG 1
12	24	..	..	or	PG 1
..	..	28	..	CG	PG 1
14	..	..	20		PG 1
..	..	..	24		PG 1

SYMBOLS

CUT—Cut thread taps, either in carbon or high speed steel.

CG—Commercial ground thread taps in high speed steel. See Standard Tables.

PG—Precision ground thread taps.

This is one of a series of advertisements published by the Greenfield Tap and Die Corporation to help users get greater production from their taps. The entire series is now available in booklet form. Send for a copy.

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In Canada:
GREENFIELD TAP AND DIE CORP. OF CANADA, LTD., GALT, ONT.

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TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

Pumps
New ~~Lamps~~ for Old
...at a Saving!

YES, you *can* retire your old pumps and save money! Save vitally needed power, too. For improvements have made today's Fairbanks-Morse Pumps so much more efficient that they often pay for themselves by their savings in as little as a year.

They are superior mechanically, too . . . maintain their efficiency longer. More accessible, they are more likely to be kept in good condition, to continue their big power savings. And, due to volume production and advanced methods, they cost less. They can often be bought for little if any more than the cost of repairing the pumps they replace.

Your pumps may be consuming up to 25% more power than necessary. An F-M Pump Engineer can appraise their efficiency quickly and accurately. For consultation without cost or obligation, write Fairbanks, Morse & Co., Dept. D75, 600 S. Michigan Ave., Chicago. Branches and service stations throughout the United States and Canada.

FAIRBANKS-MORSE NON-CLOG SEWAGE AND TRASH PUMPS
A complete line of vertical-shaft and horizontal-shaft pumps for handling fluids containing large solids and much foreign matter, such as unscreened sewage, storm water, tannery waste, sardines, bagasse, food solids, and pulp.

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ABP ABC

STEEL

ESTABLISHED 1882

Contents

Volume 110—No. 16 **April 20, 1942**

BEHIND THE SCENES WITH STEEL 4
HIGHLIGHTING THIS ISSUE 35
EDITORIAL—Reckless Sniping Is Dangerous in Wartime 37
NEWS
Conversion Pictorial Feature 38
Patent Pooling Attacks Draw Vigorous Replies 42
Knox Says President Should Establish National Labor Policy 44
Steelworks Operations for Week 45
Construction Industry Facing Best Year, Despite Limitations 47
Financial 47
Metalworking Industry Advisory Committees Appointed by WPB 52
Heavy, Medium Truck Production To Halt When Quotas Are Filled 53
Scarcity of Men, Metals Challenges Ingenuity of Machine Tool Builders 54
Women To Be Called to Shops as War Labor Force Is Expanded 55
Men of Industry 60
Obituaries 62
Meetings 62
Activities of Steel Users and Makers 63
Canada Moves To Facilitate Steel Deliveries from U. S. 65
Awards on the Industrial Front 66
Plant Committees Push Speed and Volume Campaigns 68
WINDOWS OF WASHINGTON 48
MIRRORS OF MOTORDOM 57
THE BUSINESS TREND 69
TECHNICAL
How a Large Company Conserves Material by Substitutions, Standardization—By David R. Kellogg 72
Electrographic Analysis—A Quick Method of Analyzing Metals—By E. A. Arnold 74
Manufacture of Alloy-Clad Sheets, Method of Saving Strategic Metals 82
Applied Psychology Increases War Output 116
Joining and Welding
How To Avoid Cracks in Welds 78
Welding Domestic Oil Furnaces—By J. E. Waugh 84
Reconditioning Oil Tanks by Simplified Arc Welding Method 96
Progress in Steelmaking
High-Iron Charges in Open-Hearth Practice—By Lewis B. Lindemuth 88
Materials Handling
Rotary Index Feed Speeds Blanking in Aircraft Manufacture 93
Metal Finishing
Silver Plating as a Substitute Coating in This Emergency—By Dr. C. B. F. Young 94
INDUSTRIAL EQUIPMENT 98
MARKET REPORTS AND PRICES 119
NEW BUSINESS 131
CONSTRUCTION AND ENTERPRISE 136
INDEX TO ADVERTISERS 144

PRODUCTION • PROCESSING • DISTRIBUTION • USE

To Right: A sectional view of Continental Tool Division of Ex-Cell-O Corporation . . . grinding broaches and other precision-made Continental cutting tools.
Below: A few of the many precision cutting tools made by Continental Tool Division of Ex-Cell-O.
To Right: The Continental Counterbore with the indestructible drive . . . and various precision cutting tools made by Ex-Cell-O with this well known drive.
Where QUALITY and WORKMANSHIP count!
Cutting tools . . . made right . . . are becoming more and more vital in the rush for war production. There's no time now to experiment with inexperienced cutting tool sources. Continental engineers at Ex-Cell-O Corporation have been making high-grade cutting tools of many types and sizes for more than 25 years.
EX-CELL-O CORPORATION • DETROIT, MICHIGAN
EX-CELL-O XLO Precision MACHINES AND TOOLS
To Left: A few of the many carbide-tipped cutting tools made by Continental Tool Division of Ex-Cell-O.
To Right: Where sizable production with close accuracy and good finish are required, broaching has many advantages. Shown are some of the different kinds of broaches produced by Continental.
Below: Another sectional view of Ex-Cell-O's Continental Division where standard and special cutting tools of various types and sizes are made for war production jobs.
Above: Another widely-used cutting tool bearing the Continental name . . . inserted blade face milling cutter.
XLO
EX-CELL-O PRECISION

HIGHLIGHTING
THIS ISSUE OF
STEEL

THIS WEEK'S pictorial feature on conversion from peacetime to wartime production tells how a number of smaller manufacturers made the switch **(pp. 38-41)**. A vast additional amount of such conversion still lies ahead and is to be pushed just as rapidly as it is possible to do so. While government representatives are trying to render all possible help in enlisting additional facilities for war production, past experience proves that the chief factor in making the necessary conversions is the amount of initiative and determination with which the manufacturers involved go after the necessary contracts or subcontracts. Only by getting such business can a great many of them count on remaining in business.

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Women on Machines

The machine tool industry reviews its problems, one of which arises from the fact that it no longer may have nickel **(p. 54)** . . . . It now is clear that training of women to perform machine operations will be on a vast scale **(p. 55)** . . . . The problem of providing transportation for war plant workers already is becoming acute **(p. 57)** . . . . Industry resents unwarranted government accusations which are featuring the patent law hearings **(p. 42)** . . . . Re-examination of government contracts is to involve many additional companies **(p. 58)** . . . . New organization is the Associated White Metals Smelters of America **(p. 63)** . . . . First heat will be poured this week at the new Texas steel plant **(p. 45)**; new blast furnaces are to be built in that state **(p. 67)**.

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National Labor Policy

President Roosevelt at last has indicated he is about to establish a national labor policy **(p. 44)**; in the meantime slowdowns have affected production on a number of Navy contracts . . . . "Floating" cars eliminate side-sway and lurching **(p. 62)** . . . . The labor-management committee method for promoting production is making rapid progress **(p. 68)**; more war plants are on 24-hour schedules . . . . The recent Steel Conservation Order is held up temporarily to work out details **(p. 48)**; it will result in discontinuance of production of more than 400 items made of steel. Anti-inflation policy is beginning to take shape; Cuba will become important source of nickel; steelmakers have higher priority on repair materials . . . . Various new government orders and activities affect industry **(pp. 49, 52, 53)**.

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New Method Of Analysis

Electrographic analysis, explains E. A. Arnold **(p. 74)**, is a comparatively new method of analyzing metals that does not destroy the sample, takes only a few seconds or minutes, gives positive color reactions, shows distribution of element sought. . . . A discussion of how to avoid cracks in welds, **(p. 78)** is approached by studying the forces encountered. . . . To speed training of men for war production, General Electric Co. plans **(p. 80)** to distribute a series of color films on arc welding. . . . A rotary indexing feed table **(p. 93)** is employed by an aircraft company to speed blanking and forming operations by positioning work under the ram automatically.

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Silver for Coatings

Dr. C. B. F. Young tells **(p. 94)** why silver plated coatings are being so widely considered as an important substitute for coatings of nickel, chromium and other scarce elements. . . . Another method of conserving strategic metals is a new process **(p. 82)** developed to produce steel sheets protected with a cladding of copper or copper alloy. It is now being extended to produce sheets clad with brass, gilding metal and stainless steel. . . . What one manufacturer has done to conserve materials is told **(p. 72)** by David R. Kellogg. . . . The scrap shortage is permanent, says Lewis B. Lindemuth, so the handling of high-iron charges must be licked. He explains **(p.88)** some of the major problems.

Through Peace and War—
A Century of Service—

THROUGH 100 YEARS of peace and war—good times and bad—Ryerson has served industrial America. As in every other crisis, we continue to provide steel to meet the emergency requirements of our nation at war.

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AS THE EDITOR VIEWS THE NEWS

STEEL
April 20, 1942

RECKLESS SNIPING IS DANGEROUS IN WARTIME

It is too bad that so many Americans choose this particular time to find fault with each other. If one were to take seriously the accusations which have been widely publicized recently, he would be forced to conclude that most of our citizens are prompted by the basest of motives.

Consider the furore over the acts of companies which have dealt with German enterprises. A congressman gets a bit of information which looks bad. Without checking thoroughly, he issues a series of wild charges and hales representatives of the accused company before an investigating committee. The entire proceeding is attended by scare-head publicity. Regardless of whether the company later proves its innocence, the public gets the idea that it and perhaps many other American corporations have been working hand-in-glove with the enemy against the interests of their own country.

A more sensible method of dealing with cases of this kind should be employed. The government has ample facilities for investigating suspicious practices. Why not get the facts first and then if they justify action, let the proper authorities discharge their duties in the ordinary way? Then adverse publicity would be meted out to companies only after it was clearly evident that they deserved it.

Recently one of the investigating committees issued a statement charging that numerous companies holding war contracts had increased salaries of executives by outrageous percentages. It is true, of course, that some companies have increased salaries more than circumstances warrant. But, unfortunately, one of the executives held up in this statement as a 'horrible example' happens to be a man who held a relatively unimportant job in the late thirties but who stepped into a tremendously important post in the forties. Naturally his increase in salary, expressed in percentage, looks suspicious. But he has become, in a few years, an outstanding figure in his industry. He deserves commendation, not censure.

Even worse than the injustice done to individuals and corporations by this irresponsible sniping is the false impression given to the public. To exaggerate evil in one class is to breed suspicion and hate in others. Now is no time to rekindle the fires of class hatred in America.

E. L. Shaner

Editor-in-Chief

Here are the reasons why you must . . .

CONVERT YOUR

TO WAR PRODUCTION

LIVES OF millions of Americans and the outcome of the war itself depend today upon the speed with which our industrial plants shift over to full war production, for war respects no timetable. Thus we dare not wait until we can build sufficient special-purpose plants and machines to make the weapons we need. Right now war production is crying for every production facility we can muster—especially machine tools—for even garages, repair shops, and home workshops are being enrolled in this life-and-death battle for production.

Given an equal start, we could outproduce the entire Axis—single-handed. But the start was not even. America IS BEHIND for the enemy has mobilized his entire industrial forces for nearly a decade with the single purpose of building an invincible military machine. Even after the quick and tragic fall of Poland, Belgium, France and the rest, and our own serious losses, many of our manufacturers are still loath to leave the ways of peace and get into this fight.

But you say, "How about our vast new arms plants built or begun?" While some of these are in production and many existing plants have shifted over to war work, the bald truth is that this country, the greatest industrial nation on earth, *is still handicapping its armed forces with a lack of sufficient fighting equipment.* Too little and too late are still defeating the United Nations.

To get an idea of the job facing us, consider what Germany has done.

With a national income of only 40 billion dollars against ours of nearly 100 billion, Germany last year produced 27 billion dollars worth of war goods while the "Arsenal of Democracy" brought forth a total of 15 billions for ourselves and the other United Nations. With Italy and Japan, total Axis production was around 45 billions, equal to that of Britain, Russia and the United States together. Yet to overtake the Axis and to go on to decisive victory, we must out-produce it 2½ to 1, military authorities agree.

Axis successes so far are largely due to the completeness with which they have geared their industrial potentialities to war needs. In Germany, Italy and Japan, there has been no thought of business as usual for some time, for conversion of civilian production to war production was considered a prime requisite as a prelude to conquest.

As far back as 1936, Hitler began converting large plants to war work. His original idea was to concentrate war work in mass production plants, leaving some 2,000,000 small shops to meet civilian needs. But in 1938 he changed his industrial strategy because the little shops proved less able to produce complete civilian items than to make bits and pieces of war machines. So a few efficient large firms in each industry were assigned the job of filling minimum civilian requirements.

Then through a vast system of subcontracting, Hitler put his skilled

Fig. 1—In peacetime, this worker's job was to machine shafts for rock crushers. Now the small shop which employs him is doing machining work for a large company filling a Navy contract. Same man, same machine, but now they make gun mounts. Here he sets up a tool post grinder in a lathe

Fig. 2—Instead of making power-driven lawnmokers, this manufacturer has retooled his plant to produce track sprocket hubs for tanks. Both man and machine have been converted to make their efforts count in war production work in vital 1942

Fig. 3—Fingers long skilled in assembling small parts for phonographs and recording devices now aid the war effort by speeding the assembly of small parts for intricate communications equipment so vital in war. — All photos from Office of Emergency Management

PLANT

Part I
The Axis Converted, Years Ago

workers — blacksmiths, tinsmiths, electricians, die workers, watchmakers—to work on war production in their small shops and even in their homes. Work and materials reached them through prime contractors and through jobbers—men who lined up production capacity for prime contractors and military authorities. Small shops formed cooperative pools and got contracts, each doing what it could with what it had, together turning out assemblies or subassemblies.

The entire conversion program was greased financially by the German Industrial Bank which advanced long-term low-cost loans to firms that wanted to expand, build or convert facilities for war production.

Italy also succeeded to an important extent in intensifying its war production. Although there most war production is handled by mass production plants because they can process most of the raw materials Italy can get, smaller firms were brought in through subcontracting as they were needed. Now in an effort to make the most of Italy's manpower, Germany is importing Italian labor for its own industry.

Japan, too, has been intensively developing its key industries—iron and steel, shipbuilding, oil refining, machinery and tools—for 25 years to increase its military power. While this expansion has centered around government owned and operated arsenals, the construction of private plants that can or could produce war items has been stimulated. Importation of 270 items nonessential to the war machine was forbidden as early as 1937 so all foreign exchange could be mobilized to purchase war essentials such as United States scrap iron.

Subcontracting had been practiced extensively in Japan for some time, and this experience facilitated conversion of its industrial machine to war production. Rationing of civilian goods—a sure indication of conversion—began in July, 1938.

Fig. 4—Old hands and young hands—hands that used to guide machines in the manufacture of automatic vending machines—operate the same machines in the same shop, but now they make weapons for our fighting men. Here workmen are running a jig boring machine to produce a bullet die

After the shock of Dunkerque—three years after the Axis began all-out production—England abandoned the idea that war needs could be filled in war plants and got busy converting existing facilities as the realization was driven home that this war would have to be fought and won with the production facilities at hand, not those that would be ready a year or so later. The result of this realistic approach is that intensified war production in England now accounts for 60 per cent of the national income, instead of 20 per cent.

From the standpoint of conversion, we are today five years behind the Axis. But fast action NOW will enable us to cach up, long strides at a time, for facilities in this country that last year produced 20 billion dollars worth of civilian goods *can be converted to war production this year.* This industrial power, when added to our special purpose facilities built and being built, will put us in sight of our goal of 40 billion dollars worth of war production in 1942.

BUT THIS MEANS CONVERSION—NOW! ! !

These manufacturers shown here have already realized the need for conversion to war work and are now in the battle of production. They will not have to close their plants because of the WPB order stopping manufacture of consumer durable goods. Are you in the same favorable position? Better get on the band wagon while there is still time.

Already most of our large and many of our medium sized plants are in war work. It is especially to those medium and small plants not now in war work that this plea is directed. Get into this picture now while your efforts can still count in vital 1942. Survey your production facilities; then see your nearest War Production Board Contract Field Office (list on Page 26, Section Two, this issue of STEEL) for war production opportunities. Please turn over.

CONVERT YOUR PLANT

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Continued

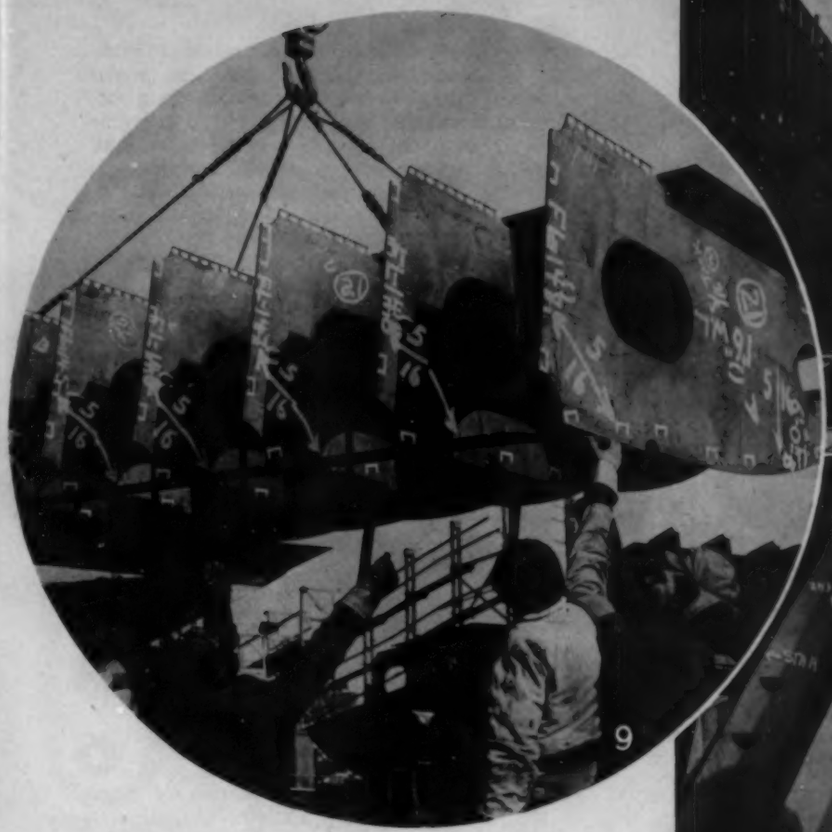
Fig. 5—Large and small, light and heavy manufacturers alike are converting their production facilities to aid the war effort. Instead of freight cars, this huge eastern plant turns out subassemblies for cargo ships. Here are knee brackets ready to be welded between ship deck beams and frames at the start of the production line

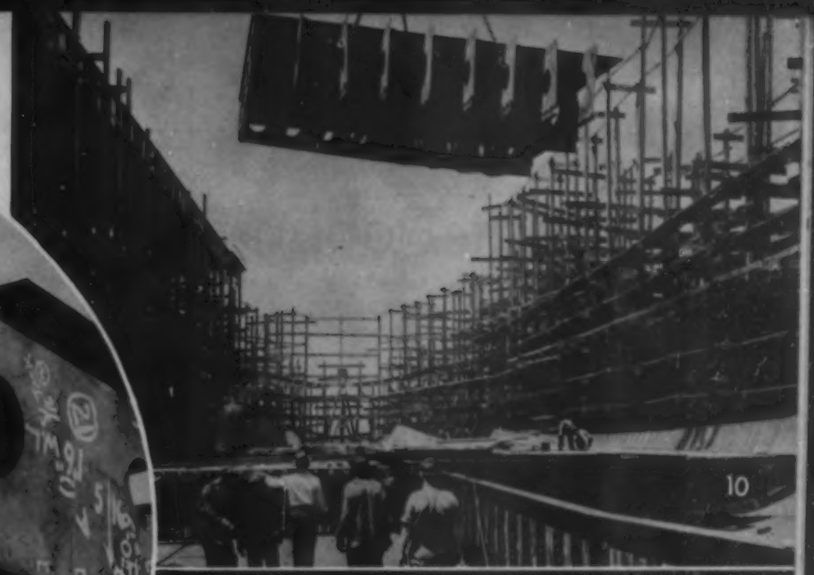
Fig. 6—This multiple-torch cutting device accurately cuts two plates at one time. It "reads its own pattern" as the far operator guides the tracer wheel over the exact pattern on the far table. Movement of this tracer is transmitted to the cutting torches by means of a pantograph arrangement. Unit is cutting floor plates for a tank section in this view

Fig. 7—Workman is constructing a wooden templet which will be used as a pattern for laying out a number of steel plates. For details of conversion of much heavy equipment at this plant, see STEEL, Feb. 23, 1942, p. 37, "Pre-Assembly Speeds Building of 'Ugly Duckling' Cargo Vessels"

Fig. 8—This shows part of a huge plate roller of German design built at a cost of $180,000 in 1919-20 and purchased from a used machinery dealer for $45,000 when the freight car shop was converted to war production. It would take a year to replace the giant machine. Now it shapes 420 plates a week. It is a one-man machine. Its master, Albert Alms, helped build this wonderful wringer when he was a young machinist, learned to operate it, then made it his career. He has been with it ever since

Fig. 9—These prefabricated subassemblies are inner bottom tank sections. They are ready to be welded into the ship as a unit. They were prefabricated in the old freight car plant and carried six miles on railroad flat cars to the shipyard on the coast nearby. Here sections are being stacked alongside





the ship ways awaiting their turn to be assembled into the ship

Fig. 10—At this point the sections are pieced together to make the ship. Several floor sections already installed can be seen in the background. Workmen are standing in what will later be the lowest part of the hold of the ship, near the keel. Another floor section is being lowered in place. All photos from Office of Emergency Management; Figs. 5 to 13 by Palmer

Fig. 11—Here two different subassemblies are rapidly nearing completion. Note plates are tacked into position using rods to space the plates correctly. Instead of making a ship every seven days as now, the workers expect to complete one every six days in the near future

Fig. 12—Welding is more important than ever before in shipbuilding for it saves time, weight and steel. A prefabrication system has been worked out here in which groups of plates are assembled into sections or units which then are joined together at the nearby shipyard to make the finished vessel in a short time. Assembling the parts in groups allows the section to be positioned so the welding can be done in the most favorable position. Most welds are verticals or fillets

Fig. 13—Another big machine is this giant shear which is employed to cut out accurately a multitude of parts in heavy plate. This machine, however, was part of the original plant equipment used to make freight cars

Patent-Pooling Attacks Draw Vigorous Replies By Accused Companies

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"Mud-slinging campaign" says Carboloy president. . . "United States would have been at mercy of German sources if we hadn't obtained patents from Krupp"

◆

EXECUTIVES of several large companies accused by government officials of having engaged in monopolistic practices through patent pooling arrangements with German firms emphatically denied the charges last week.

Replying to a statement by John Henry Lewin, an assistant to the Attorney General, before a Senate committee that a shortage of tungsten carbide exists in this country because of a patent-pooling agreement between General Electric Co. and the Krupp armament works in Germany, W. G. Robbins, president of Carboloy Co. Inc., Detroit, a General Electric subsidiary, said:

"At the Senate committee meeting I could keep still no longer. I resent being called un-American even by inference. This is not the first time accusations have been thrown at us—in the form of inferences and conclusions—which have absolutely no foundation in fact and which apparently are designed almost entirely as a mud-slinging campaign.

"The whole business would be silly if it were not seriously influencing public morale and destroying confidence at a time when everybody's effort should be directed toward all-out war production.

"Mr. Lewin states that there is a scarcity of tungsten carbide. There is no scarcity and there has never been any. Carboloy has been able to take care of every United States order, and in addition has also been supplying England and Russia since 1939.

"It is asserted that we maintained artificially high prices even though during the period in question the Carboloy company made six price reductions in spite of the fact that it was continuously operating in the red.

"It is inferred that General Electric and Carboloy restricted or is restricting production of this material and is, thereby, slowing up the war effort. This is not true. In 1938 the facts show that there were some 97 manufacturers of Carboloy tools in the United States and at no time were all carbide manufacturers under license or price control. As far as the present patent relationship with Krupp is concerned, there just isn't any. Anybody can make carbides.

Worked with Arsenals

"It was because General Electric appreciated the possibilities of tungsten carbide and secured ownership of the vital patents then owned by Krupp that the government and war industries can now obtain all the carbides they need.

"If we had not done so, the United States would have been at the mercy of German sources of supply just as England was at the outbreak of the war. Fortunately, Carboloy had the production capacity at that time—and still has—to ship enormous quantities of carbides to England—in addition to meeting United States needs.

"For years Carboloy and General Electric have been working closely with the War Department and government arsenals. For years there have been available machine tools designed to employ these fast-cutting carbide tools to the machine. For years, the Carboloy company has been carrying on an effective and wide-spread educational campaign on the use of these tools. In one two-year period, long before the war, some 10,000 men in industry were given training courses on the use of these tools.

"Even the allegation that an indictment lodged against the Carboloy company resulted in dropping the price of the material is false. It has been said that at that time the price dropped for the first time to $48 per pound and previously had never been under $200. As a matter of fact, for a year prior to this Carboloy had been available for actually less than $48 per pound.

"These are all facts which are well known. In the light of this, it is hard to understand the reason behind the constant reiteration of false public accusations.

"I am indicted in the Carboloy case. Certainly I have the right, as an American citizen, to say that I shall not be smeared before trial by the official prosecutor of my case, either in a Senate committee hearing or elsewhere."

Five companies and five individuals last week entered *nolo contendere* pleas to a series of Sherman antitrust indictments alleging restraint of trade and monopolization of magnesium in federal court in New York. They were fined a total of $140,000.

I. W. Wilson, vice president, Aluminum Co. of America, speaking for that company and the American Magnesium Corp., said:

"None of us is conscious of any wrongdoing whatever in connection with any of our activities in the development of the magnesium industry. However, we are mindful of the fact that in the recent antitrust suit in which the Aluminum Co. of America was a defendant officials and key employes of the company were required to be away from their regular duties and in attendance at court for many months at a time.

"We feel that in the critical situation which confronts us all today, with the Aluminum Co. of America and American Magnesium Corp. occupying the vital position of supplying so much of the necessary aluminum and fabricated magnesium for the war effort, we must settle this case at any cost as quickly as possible so that all our time can be entirely devoted to the defeat of the Axis powers. The burdens of litigating with the United States government at this time are manifest."

Willard H. Dow, president, Dow Chemical Co., issued the following statement:

"It is generally known the Dow Chemical Co. has for many years been the sole producer of magnesium in this country. The reason we have been the only producer of magnesi-

um in this country was because the demand was insufficient to attract other producers at the price we were quoting.

"Dow Chemical pioneered the development of the magnesium industry in this country. Since 1918 we have been in commercial production of this vitally important war material. We developed and own outright without any strings attached our own process for producing magnesium. Two years before the Pearl Harbor incident we foresaw the increased need for magnesium in this country and doubled the production capacity of our magnesium plant—and shortly again doubled this—all with our own money. Our plants today are producing essentially all the metal being made in the United States.

"In 1934 in order to make available to users of magnesium in this country certain United States patents covering the use of magnesium we entered into a contract with Magnesium Development Corp., whereby we were granted the right to license others under these magnesium use patents. The effect of this has been that since 1934 these patents have been made available to the American public thereby greatly expanding the use of magnesium in this country."

Contracts for a $20,000,000 magnesium plant in the St. Clair river salt district, to be operated by the Dow company, have been awarded to Austin Co., Cleveland. Brine will be shipped from Ludington, where a $40,000,000 plant is being constructed.

In Jersey City, N. J., where the National Lead Co. held its annual meeting last week, it was stated that freeing of existing patents on production of magnesium metal in the consent decree filed in New York opens the way for National Lead to proceed with a government request to build a plant for production of magnesium.

National Lead expects to use the Pidgin process using dolomite ore as raw material in a plant which the WPB and the MRC have asked the company to undertake. Site has not been selected, though action is expected within 30 days.

"More Subcontracting Will Help Win the War," Says WPB Chieftain

WASHINGTON

INCREASED subcontracting may swing the balance in this war, WPB Chairman Donald M. Nelson said last week in an open letter asking major prime contractors to spread more work among other firms whenever deliveries can be hastened by this policy.

Although subcontracting may increase costs, speed is the essential consideration now, he said.

Mr. Nelson's letter, designed primarily for contractors on critical items, follows:

"More subcontracting will help win the war.

"Production speed is the dominant factor in the race with the Axis; we have no time to wait for new tools and new plant facilities.

"Every available idle tool that can be put to work must be put to work. This may cost more, but the job must be done fast, and experience has taught us that some prime contracts can be subcontracted as much as 90 per cent.

"Planes, tanks, guns and ships—their parts and subassemblies are needed in an ever increasing flow, and only by full use of existing facilities, by sharing the work, can we get them soon enough.

"Every prime contractor can help. Every prime contractor should consider having an established subcontracting department. Subcontractors should be given engineering assistance. Plants with as few as five or six machines can and should use used in subcontracting.

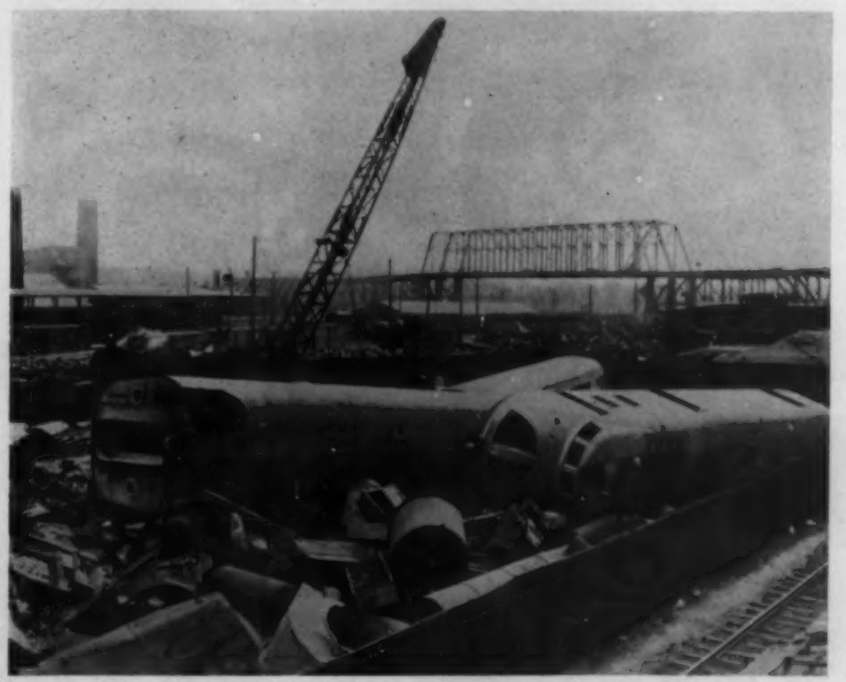
"The War Production Board has established field offices throughout the United States, now grouped in thirteen regions. One purpose of these offices is to effect the fullest and most efficient utilization of facilities within their areas. For this purpose, they maintain records of machine tool equipment and other facilities of manufacturing establishments. I urge you to make your subcontracting needs known to the nearest office.

"With the future of our country at stake, with our armed forces in immediate need of more weapons, imagination and boldness are called for on the industrial front. Increased subcontracting may swing the balance.

"Production lines are battle lines. Let's use all the production we've got."

Mr. Nelson told the American Society of Newspaper Editors in New York last week: "We are over the hump in war production. Today the combined production of America, Russia and England undoubtedly is greater than the combined Axis production. That doesn't mean we are going to win the war next month, or that we can start out tomorrow to take the offensive."

Union Pacific Streamliner Scrapped for Aluminum



OMAHA: Swift obsolescence and war requirements have cut short the career of Union Pacific's former crack streamliner, CITY OF SALINA, shown on the railroad's scrap pile here. The cars will yield 100,000 pounds of aluminum for use after processing in combat aircraft. NEA photo

Knox Says President Should Establish National Labor Policy; F.D.R. Agrees

WASHINGTON

FREEZING of the closed shop issue for the duration of the war and establishment of a national war labor policy by executive order were advocated by Frank Knox, Secretary of the Navy, before the House Naval Affairs Committee last week.

Mr. Knox, testifying on the Vinson bill to suspend the 40-hour week, expressed the opinion the President should set up a national labor policy, but that if he failed to do so in 30 to 60 days, Congress should act. He said it was probable that the President would issue such an order, and Mr. Roosevelt later said it was a good guess the secretary was on the right track.

Emory S. Land, chairman, Maritime Commission, earlier had presented testimony similar to that by Mr. Knox.

Mr. Knox opposed the proposed suspension of the basic 40-hour week in war industry, taking the stand that abolition of time-and-a-half overtime pay would constitute in effect a 10 per cent reduction in wages. To members of the committee who advocated extending the basic work week to 48 hours, he posed this question:

"Would you favor a 10 per cent pay cut throughout industry?"

Mr. Knox said his chief interest was in preventing interruptions to war production.

Although conditions in industry are susceptible to improvement, Mr. Knox said it should not be overlooked that war production is "proceeding 99.97 per cent uninterrupted."

Legislative restriction upon labor, he held, would create interruptions dissensions, and delay.

The secretary was equally opposed to applying statutory curbs to profits. "The profit motive still is relied upon as an important factor in the inducement of extraordinary war production and industrial effort. So long as the profit motive is thus relied upon, the industries in war work will and should make reasonable profits."

While Mr. Knox was insisting interruptions to war production were few at present, Senator Byrd, Virginia, released a report obtained from the Assistant Secretary of Navy showing slowdowns in eight vital war plants had cut their production from 25 to 90 per cent.

The report declared that the Long Island City plant of the Brewster Aeronautical Corp. operated at 40 per cent of capacity "due to labor leaders' demands for slowdowns, and also because of inefficient management." It continued that in several sections of the plant all employes, including foremen, were enemy aliens.

The Navy's report on the other seven plants:

Atlas Press Co., Kalamazoo, Mich.—"A 25 per cent slowdown has been in effect since Feb. 12 due to SWOC's demand for closed shop and wage increases."

Aluminum Co. of America, Detroit—"This company has been operating at approximately 40 per cent of capacity and it is alleged that CIO leaders are responsible."

Bendix Aviation Co., South Bend, Ind.—"75 per cent production is reported because workers on each shift are reporting for work a half hour late and stopping a half hour early.

Curtiss-Wright Corp., Columbus, O.—"UAW-CIO local labor leaders are reported responsible for constant discontent. Plant is operating at 60 per cent of capacity."

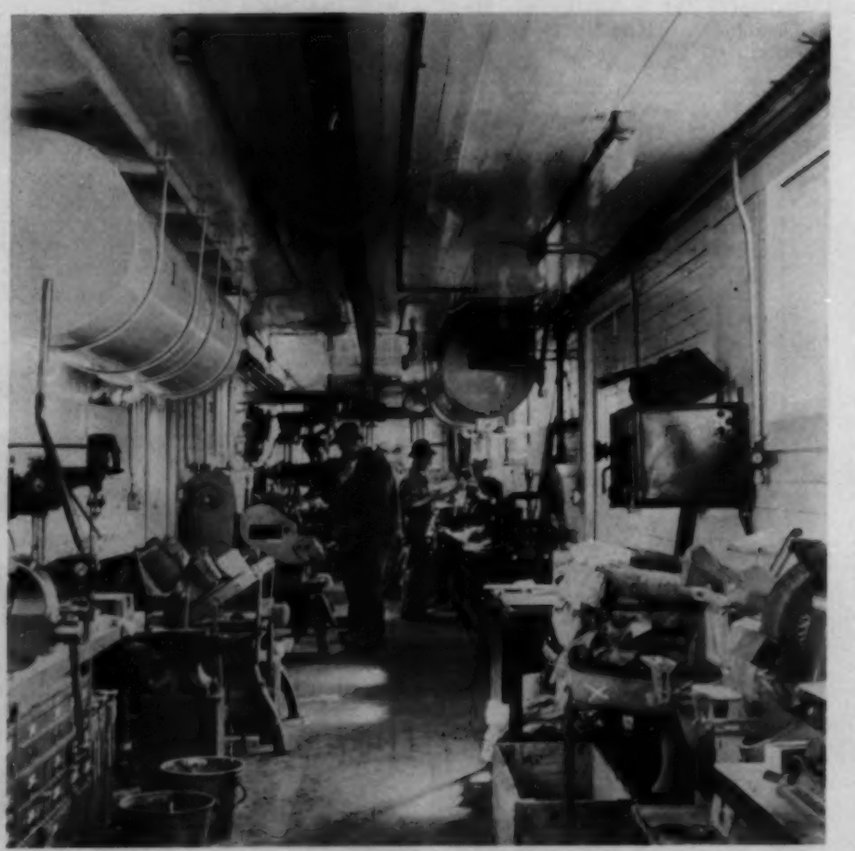
Hayes Mfg. Corp., Grand Rapids, Mich.—"Operating at 65 per cent of capacity. Union demanding wage increases."

Shelmar Products Corp., Mt. Vernon, O.—"As result of a 90 per cent slowdown since April 6, the company has had to close plant."

Police Escort Workers Through Dues-Picketing Line

In a surprise dues inspection, about 50 CIO pickets prevented about 30 of 1200 workers from entering the plant of the American Bridge Co., Gary, Ind., last week, because the men were unable to produce union cards showing paid-up dues. Police escorted all but five or six of the workers through the picket line, these refusing to go through with or without protection. They entered when the pickets departed. It was stated that plant operations were not affected.

Army Uses Rolling Machine Shop To Repair Guns



FORT MONROE, VA.—Army guns in action need constant attention and repair. Rather than ship them to central repair stations, the United States forces use former railroad maintenance cars 72 feet long, now equipped with a variety of machine tools, and welding apparatus. Each car generates its power. NEA

New Texas Plant To Pour First Steel This Week

First heat of steel made in the new Texas plant of Sheffield Steel Corp., subsidiary of American Rolling Mill Co., will be tapped this week and all departments of the new plant are expected to be in operation by late June, Charles R. Hook, president, American Rolling Mill Co., told stockholders at their annual meeting last week.

Mr. Hook showed them a wood culvert developed by company's drainage engineers to ease the steel shortage and provide drainage for cantonments and other war facilities as well as civilian demands.

WPB Experts Ask for More Electric Furnaces

Installation of more electric furnaces has been suggested by WPB steel expansion officials, it was reported last week.

The suggestion has been sent to the subcommittee on expansion of the WPB Steel Advisory Committee, of which Quincy Bent, vice president, Bethlehem Steel Co., is chairman.

WPB officials are insisting that steel mills move refractory brick from brick yards within two or three weeks after the brick order is completed. Request followed reports that mills usually leave bricks at yards for a month or six weeks and that this habit has been delaying work at the yards.

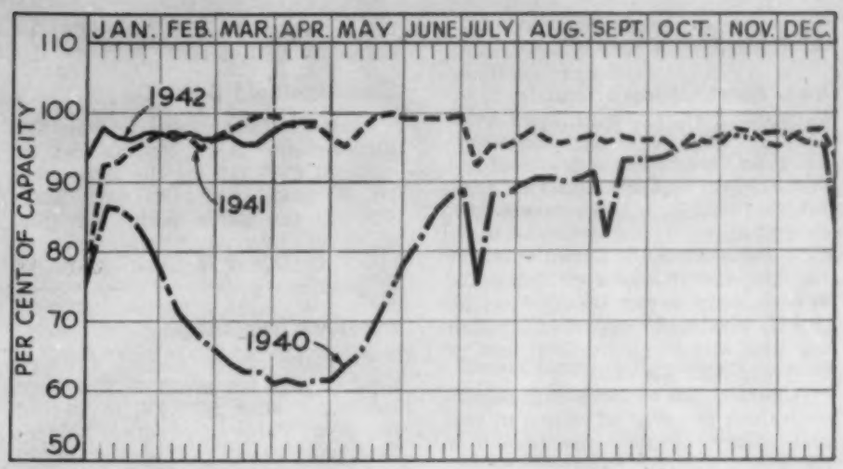
Some mills, it is reported, are building sheds in which to store refractory brick.

Buchanan Resigns as Allis-Chalmers President

Max W. Babb, chairman, Allis-Chalmers Mfg. Co., Milwaukee, last week announced that W. C. Buchanan has resigned as president because of ill health. He retains his membership on the board of directors and executive committee. He also is president, Globe Steel Tubes Co., Milwaukee.

The Allis-Chalmers directors elected Walter Geist, formerly vice president, as executive vice president, but there will be no election of Mr. Buchanan's successor until after the annual meeting, May 7. Mr. Geist has been with the company since 1909.

Designated as a "standby plant", and financed by the Navy, contracts for construction of a one-story addition to the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., were announced last week. The building will be 460 x 800 feet, will contain eight acres of production space and house craneways, sand hoppers and open hearth furnaces.



PRODUCTION . . . . Steady

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week was unchanged at 98½ per cent of capacity. Three districts advanced, six declined and three were unchanged. A year ago the rate was 98 per cent; two years ago it was 61½ per cent, both based on capacity as of those dates.

Detroit—Off 2 points to 90 per cent, as shift was made in active units.

Cincinnati — Declined 4½ points to 91½ per cent because of furnace repairs.

Cleveland — Receded 1 point to 89½ per cent, one interest reducing activity slightly.

St. Louis — Repair work caused the rate to drop 2½ points to 90½ per cent.

Buffalo — Withdrawal of an open hearth by Republic Steel Corp., for repairs, caused a drop of 3 points to 90½ per cent.

Chicago — Advanced 1 point to 105 per cent, a new all-time high. The prior record of 104½ per cent was made in December and equaled in the week of April 4. Three of the six producers increased output, one held even and two declined. Only two were below 100 per cent.

Birmingham, Ala. — Continued steady at 95 per cent, with 23 open hearths in operation.

Pittsburgh — Lost 1 point to 95½ per cent.

Wheeling — Held at 82½ per cent for the fourth week.

Central eastern seaboard — On better scrap supply steel production rate advanced 2 points last week to 94 per cent.

New England — All open hearths in this district are in production and the rate has increased 10 points to 100 per cent.

Youngstown, O.—With 72 open hearths and three bessemers in production the rate was unchanged at 92 per cent. Republic Steel Corp. added two open hearths at Warren, O., at the week end, planning to operate as long as scrap is available. The rate this week is scheduled at 94 per cent as a result.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended April 18	Change	Same week 1941	Same week 1940
Pittsburgh	95.5	— 1	100	55
Chicago	105	+ 1	102	61.5
Eastern Pa. ...	94	+ 2	96	56
Youngstown ..	92	None	97	43
Wheeling	82.5	None	84	73
Cleveland	89.5	— 1	96.5	65
Buffalo	90.5	— 3	90.5	42
Birmingham ..	95	None	90	81
New England..	100	+10	92	60
Cincinnati	91.5	— 4.5	91.5	50
St. Louis.....	90.5	— 2.5	98	45
Detroit	90	— 2	70	72
Average	98.5	None	*98	*61.5

*Computed on basis of steelmaking capacity as of those dates.

Little Chance To Increase Plate Tonnage, Says Batt

Steel authorities believe there is little chance to increase the tonnage of steel plates above that which already has been provided for, William L. Batt, chief, WPB Materials Division, told the War Production Board last week.

Mr. Batt appeared before the board to discuss the steel plate situation in all its ramifications.

FINANCIAL

Iron, Steel Group's Gain In Income Under Average

Net income of 57 companies classified as "iron and steel" totaled $326,142,000 for 1941, a 15.6 per cent gain over 1940, according to the National City Bank of New York. Their return on investment for 1941 is reported as 9.6 per cent. For 493 "metal products companies," including iron and steel, the 1941 net return was 12.2 per cent.

A partial list of industrial groups, with their per cent of return in 1941 and gain over 1940, are shown in the accompanying table:

No. of Companies	Group	Per Cent Return-1941	Per Cent Gain Over 1940
57	Iron and Steel	9.6	15.6
12	Agricultural Implement	10.6	27.6
134	Machinery	19.7	40.2
21	Office Equipment	17.1	41.0
25	Automobile	18.3	10.1
27	Railway Equipment	10.5	47.7
34	Aircraft and Parts	48.8	84.5
54	Hardware and Tools	17.8	22.7
42	Building Equipment	11.7	11.7
33	Household Equipment	16.0	25.8
21	Lumber	16.3	71.9
8	Fertilizer	4.3	73.1
1420	Total Manufacturing	12.4	20.7

Otis Steel Co.

Otis Steel Co. reports net profit of $240,015.46 for the first three months of 1942, compared with $416,621.97 for the first quarter of 1941. E. J. Kulas, president, said profit for this three-month period was substantially less than for any quarter of the year 1941 due in large part to four factors:

Smaller profit margin on the products manufactured by the company for the war effort than upon the products which it manufactured during normal times; substantially increased operating costs while selling prices are rigidly fixed; shortage of steel scrap which limited the company's production and consequent shipment; and increased federal taxes on income.

Acme Steel Co.

Acme Steel Co., Chicago, reports 1941 net income of $3,167,101, an increase of 46 per cent over preceding year. Sales in 1941 were up 68 per cent. Federal taxes increased 276 per cent.

Woodward Iron Co.

Woodward Iron Co., Birmingham, Ala., reports first quarter 1942 net profit of $397,337. This compares with $551,897 earned in 1941 quarter. Company provided for excess profits taxes of $350,756 through 1942 March quarter, against $110,108 in like period of 1941.

Crucible Steel Co.

Crucible Steel Co. of America, Jersey City, N. J., earned first quarter 1942 net profit of $1,951,111, compared with $1,489,851 in the same 1941 period.

Sloss-Sheffield Steel Co.

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., reports net income of $277,741 for the first quarter of 1942, compared with $512,359 for the same period of 1941. Sales of by-product last year totaled $2,157,000, against $2,053,000 in previous year.

Interlake Iron Corp.

Interlake Iron Corp., Chicago, reports 1941 net profit of $2,406,486, compared with $829,450 in preceding year. Value of products shipped last year amounted to $38,517,589, outstripping the $23,289,605 of 1940.

Superior Steel Corp.

Superior Steel Corp., Pittsburgh, reports net profit for 1941 of $653,358, after provision of $1,400,000 for federal income and excess profits and state income taxes and equivalent to $5.77 per share. This compares with 1940 net of $349,674, or $3.08 per share. Company has substantial backlog of war orders.

Wickwire Spencer Steel

Consolidated income statement for the quarter ended March, 1942, of Wickwire Spencer Steel Co., New York, and subsidiary, American Wire Fabrics Corp., shows net income, before taxes, of $721,580, compared with $231,172.14 in the previous year.

Copperweld Steel Co.

Copperweld Steel Co., Glassport, Pa., reports net profit of $1,460,791 for 1941, equivalent after dividends on preferred stock to $2.61 per common share. Taxes amounted to $4,635,145.

Sales volume was over 150 per cent above previous record year. Company's Ohio steel plant, operating at nearly 100 per cent on a 24-hour day, 7-day-week basis, is expected to increase steel ingot output to 250,000 tons a year with new facilities authorized by WPB.

Keystone Steel & Wire Co.

For the three months ended March 31, 1942, which was the third quarter in its fiscal year, Keystone Steel & Wire Co. reports net profit of $364,083 after all charges including provision of $405,577 for federal income and excess profit taxes. This compared with net of $410,137 for the same quarter of last year. Net profit for the nine months ended March 31 was $1,130,496, against $979,512 for the same period in the prior year.

Cleveland-Cliffs Iron Co.

Cleveland-Cliffs Iron Co., Cleveland, reports for 1941 a net profit of $4,149,512.17, after all charges, compared with $4,382,079.25 in 1940.

Expenditures for new plant and equipment last year totaled $827,278, with an additional $639,576 being applied to development of the new Mather Mine of the Negaunee Mine Co., owned jointly by Bethlehem Steel Corp. and Cleveland-Cliffs Iron Co.

Warner & Swasey Co.

Warner & Swasey Co., Cleveland, reported net earnings as $701,364 for first quarter, after all deductions including provision for federal income and excess profits taxes. Net earnings for the first quarter of 1941 amounted to $1,040,077.

Minority Proposals Rejected By Bethlehem Stockholders

Three proposals by minority stockholders were rejected by substantial majorities at the annual meeting of Bethlehem Steel Corp. in Wilmington, Del., last week. Proposals were to reduce compensation of certain executive officials, to change the place of annual meeting, and to change the method of selecting public accountants.

Re-elected directors for three-year terms were Quincy Bent, Archibald Johnston, J. M. Larkin, Paul Mackall and R. E. McMath.

Mr. McMath, who presided in the absence of E. G. Grace, president, announced Bethlehem had received Navy "E" awards at the Fore River shipyard and the Staten Island shipyard recently.

Aircraft Standardization Returns Millions to U. S.

Amplifying announcement made recently that the company is returning $14,000,000 to the government in the form of price reductions on contracts in progress, J. H. Kindelberger, president of North American Aviation Inc., Inglewood, Calif., states that standardization of training airplane designs by the Army and Navy, permitting smoother functioning of the aircraft production system, was mainly responsible for the saving effected.

He also disclosed that additional savings, amounting to almost $60,000,000, will be transmitted to the government through reduced prices on contracts now held by North American.

"Although the costs of labor and materials are higher now than when the contracts were negotiated, increased efficiency makes it possible to build combat training planes at approximately 66 per cent of the cost of those same planes in the summer of 1940," it was said.

"A large share of the credit must go to the Army and Navy standardization programs."

Construction Industry Facing Best Year, Despite Limitations

WASHINGTON

DESPITE limitations on many types of construction, the building industry this year faces the largest program in history.

Latest estimate of the volume of military and civilian construction, such as air fields, war plants, camps, shipyards and war housing scheduled for 1942 is $13,750,000,000, more than a 20 per cent increase over the figure for total construction in 1941 when an all-time record was set.

The industry has been converted almost entirely to military and other essential work.

Nonessential civilian construction, which had been declining since the fall of last year, was virtually halted April 9 when Conservation Order L-41 became effective. Establishing rigid controls over all nonwar building, the order banned residential construction costing more than $500, agricultural building costing $1000 or upwards, any other construction, privately or publicly financed, costing more than $5000.

Exempted are projects granted specific permission by the WPB, building for government agencies, restoration of structures damaged by act of God or by the enemy and certain special cases.

Construction of the type controlled by L-41 is estimated to have amounted to approximately $4,000,000,000 during 1941. When the order became effective, the volume of this type of construction already had been cut in half and was estimated to be going at a rate of only $2,000,000,000 a year.

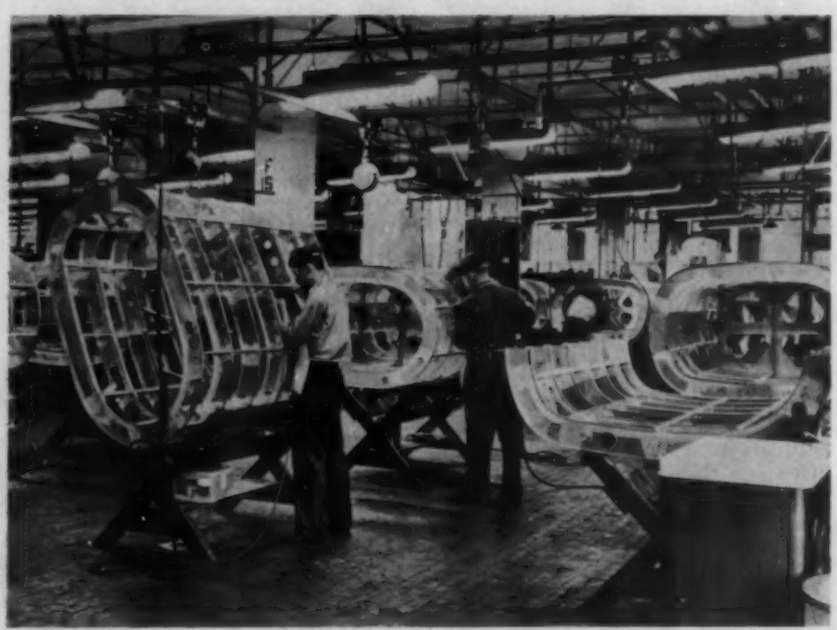
Further reductions, under the order, are expected to keep the total of nonessential construction for the entire year to less than one-fourth of the 1941 amount.

By shutting down nonessential building, approximately 250,000 laborers now engaged on projects of this type will be freed to work on essential programs. Total employment on all types of construction, including maintenance and repair, was estimated to be approximately 2,500,000 in February, last monthly figure available.

In order to complete the huge program of military and essential construction, the volume must reach about $1,250,000,000 a month. This will need a labor force of approximately 3,000,000. With the 2,500,000 already at work on essential construction programs and the 250,000 to be freed from nonessential projects, there is need for 250,-additional employes.

Total construction last year amounted to nearly $11,500,000,000, of which nearly $7,500,000,000 was classed as essential, military and civilian, and nearly $4,000,000,000 as nonessential. It is estimated that the total construction for this year will be approximately $14,-750,000,000, divided roughly into $13,800,000,000 essential and $900,-000,000 nonessential.

Fisher Making Auxiliary Fuel Tanks for Bombers



AUXILIARY fuel tanks for Army bombers such as those pictured in construction, are being made in large numbers by Fisher Body Division of General Motors Corp. The tanks augment the normal gasoline supply and permit the bombers to be ferried long distances

Issues Second Report on Critical War Materials

Increasing and spreading shortages of important war materials were reflected in a second report issued by the WPB last week.

The first report was published March 12. The second report indicates that since that time the following metals have come to be considered most vitally needed for war purposes, although they were not so listed in the first report: Nickel scrap, rhodium, tungsten carbides and high-grade zinc.

Other most vitally needed metals: Alloy steel, aluminum and aluminum scrap; cadmium, calcium silicon, chromium, cobalt, copper and copper scrap, iridium, iron alloys, magnesium, nickel, tin, tin plate, terne plate, vanadium and wrought iron.

Listed for the first time as essential basic materials, but not critically limited were: Manganese, steel scrap and pig iron.

Confusion Blamed for Scrap Price Violation Complaint

Confused regulations were to blame if any violations of the OPA scrap price ceilings were made by the Pittsburgh Steel Co., company officials said last week.

OPA charged the company bought unprepared scrap from Southwestern dealers and paid the maximum price for prepared scrap, $2.50 a ton more than for unprepared scrap. OPA obtained a temporary injunction in federal court restraining the company from violation of the price schedule.

Company was unwilling to admit or deny any violation but spokesmen said that up to April 2 the regulations regarding mixed scrap were not clear.

Texas-Eastern Seaboard Pipe Line Application Refused

Application to build a pipe line from Texas to the Atlantic coast has been rejected by Joseph Eastman, director, Office of Defense Transportation. Mr. Eastman advised the Trans-American Pipe Line Corp. that the 85,000 tons of steel required for the proposed project is not available.

Windows of *WASHINGTON*

Steel producers to be lightly affected by conservation order . . . President shapes five-point anti-inflation program . . . Board of Economic Warfare given power to purchase and stockpile raw materials . . . Cuba seen important new source for nickel . . . Higher ratings for repair materials assigned iron and steelmakers . . . Cast iron soil pipe standardized by WPB order . . . Less metal permitted in furnace manufacture

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

STEEL conservation order announced recently by WPB Director Nelson has been held up several days so that details may be worked out.

It is reported on good authority that the order, when it is finally made public, will apply to more than 400 items made of steel on which production will be stopped.

Original idea of the order was to keep firms from manufacturing who seemed in some way to obtain steel supplies to which WPB did not think they were entitled.

The effect of the steel conservation order on iron and steel production schedules is not expected to be severe. Producers point out that for months past the bulk of the tonnage moving from the mills has been on high-rated war orders, and that consequently, but a relatively small amount of business will be affected by cutting off the civilian consumer market.

As to civilian goods production however, considerable disturbance is expected. Immediate disemployment of thousands of workers is seen, but the action is likely to hurry along plant conversions to essential war work. This, it is said in official quarters, will more than compensate for any inconvenience and hardships experienced during the period of production curtailment.

Anti-Inflation Measures Hold President's Attention

Administration anti-inflation policy is beginning to take shape.

Concern expressed by informed persons recently with respect to rising prices and wages is being translated into definite action, it is understood, with President Roosevelt working on a program which will shortly be promulgated.

Principal parts of this program are said to include:

1—Issuance of an over-all ceiling order by OPA covering the most important retail and wholesale prices still uncontrolled.

2—The President will direct the War Labor Board and other agencies passing on wage demands to put into effect some flexible wage control.

3—The President will ask Congress to enact either forced savings law or a law forcing savings and some taxes in addition to the $7,600,000,000 already recommended by the Treasury Department.

4—The Federal Reserve Board will strengthen its restrictions on consumer credit.

5—The President will reiterate his directive to the Army, Navy, Maritime Commission and other agencies involved in procurement to renegotiate war contracts where profits are excessive, and review all war contractors' books, with a close check on excessive salaries, bonuses and remuneration to executives.

It is said the OPA's extensive ceiling price order probably will require a more rapid extension of rationing for important consumer goods like food and clothing.

Raw Materials May Be Purchased by BEW Unit

The President has issued an executive order placing the power for buying raw materials in the international market for the United States government under Vice President Wallace's direction in the Board of Economic Warfare. Jesse Jones formerly held this control through the RFC and its subsidiaries.

Under the executive order, the Board of Economic Warfare may "direct . . . . the creation, organization and financing of a corporation pursuant to . . . . the Reconstruction Finance Corp. Act." This corportation which BEW may organize shall "obtain from foreign sources such materials, supplies and commodities . . . . as are necessary for the successful prosecution of the war. It shall also provide other disposition thereof."

South American copper, Mexican zinc and lead, Australian lead, African manganese, etc., which Mr. Jones has bought and sold, now will be bought and sold by BEW.

Buying and stockpiling of domestic materials has been subject to direction by the War Production Board since that agency was established and this power will continue to be exercised over transactions by the Board of Economic Warfare.

Cuba To Become Important New Source for Nickel

Cuba is on its way to become a new source of badly-needed nickel, William L. Batt, WPB Director of Materials, announced last week.

Large deposits of low-grade ores blanket a plateau on the northeastern section of the island. Treated by a complicated chemical and metallurgical process, recently developed by Freeport Sulphur Co. through its subsidiary, Nicaro Nickel Co., the deposits are expected to yield considerable quantities of the critical alloying metal.

The process has been investigated by a technical committee appointed by the government and pronounced sound.

Several weeks ago, WPB authorized a project for a $20,000,000 plant (STEEL, March 23, p. 54) to be operated by Nicaro Nickel Co. for the government. Before the final contract was signed the company started construction. At present a crew of several hundred engineers and workers, many of them Cubans, are at work on the project.

Steelmakers Assigned Higher Rating for Repair Materials

Steel producers have been granted a higher preference rating for

materials for maintenance and repair and may extend the higher rating to their suppliers.

Amendment No. 3 to Preference Rating Order P-68 grants a rating of A-1-c to 30 per cent of the dollar value of repair and maintenance materials and operating supplies ordered in any one quarter. An A-3 rating continues applicable to the remaining 70 per cent.

Producers are required to file monthly reports on Form PD-228 with the WPB showing applications of the A-1-c rating.

A-1-a ratings in case of actual breakdowns and A-1-c ratings to make reasonable advance provisions against breakdowns are not changed.

Manufacture of Cast Iron Soil Pipe Limited to Single Weight

Amendment of Schedule IV to Limitation Order L-42 to limit manufacture of cast iron soil pipe to a single weight was announced last week by WPB.

The specifications ordered by the WPB are for a pipe slightly heavier than soil pipe known commercially as "standard", but lighter than pipe now classed as "medium." Effective June 1, only the new weight pipes may be produced, eliminating "standard," "medium" and "extra heavy."

This will also replace the current soil pipe simplification program, in effect since April 1, which discontinued "medium" types, and reduced the weight of the "extra heavy."

The schedule, in limiting nonessential production of cast iron soil pipe, is expected to save about 80,000 tons of pig and cast scrap iron this year. Production of soil pipes and fittings in 1941 reached approximately 550,000 tons. Anticipated requirements for this year will be considerably lower because of a decrease in private building construction.

Copper Prohibited in 13 Plumbing Fixture Products

Addition of thirteen plumbing fixture products to a list of articles for which use of copper or copper base alloy is prohibited was announced last week by WPB.

A new schedule (V-a) to Limitation Order L-42 becomes effective on June 15. It is expected that the regulations will result in a saving of approximately 1000 tons of copper and brass a year.

The articles affected are: Bath tub fillers and nozzles; shower fittings; lavatory compression faucets; lavatory combination faucets; sink compression faucets; combination sink faucets and spout; combination faucets for laundry tubs and spouts; combination faucets for wash sinks; laundry tray faucets; outlet plugs and strainers; tail pieces; flush ells; flush valves for closet tanks.

Shipment of Alloy Samples To Be Permitted by WPB

Steel companies melting national emergency alloy steels have been given authority to ship specimens to laboratories or manufacturers without regard to preference ratings.

Purpose is to obtain the widest possible testing of these new steel alloys, which reduce quantities of alloys used and are based upon the principle that small quantities of various elements are more effective than larger quantities of a single element.

Those receiving these steels must certify in their purchase orders that the material will be used for experimental purposes; that the amount ordered, together with any on hand or on order from other mills, will not exceed 500 pounds for any one specification, and that the total on hand or ordered for all types does not exceed 10 tons.

Reduce Use of Iron, Steel In Warm-Air Furnaces

WPB has ordered a reduction in the amounts of iron and steel which may be used in the manufacture of warm-air furnaces.

The order (L-22) was effective on April 11, and covers all warm-air furnaces designed to heat the interior of a building, except those commonly known as space heaters or floor furnaces.

The terms of the order limit larger manufacturers to the use during 1942 of 50 per cent of the iron and steel consumed in 1940. Smaller manufacturers, or those who made or assembled less than 8000 furnaces in 1940, are required to reduce iron and steel consumption 10 per cent.

It is estimated by the WPB Plumbing and Heating Branch that the regulations will result in the saving of approximately 100,000 tons of iron and steel, and reduce the consumption of the industry to about 200,000 tons. This is the amount of iron and steel calculated to be needed for the manufacture of furnaces for military, war time housing and essential civilian replacement purposes.

Long-Term Coal Contracts Allowed by OPA Regulation

Sales of anthracite under long-term contracts which stipulate that the price shall be the OPA maximum price in effect as of the date of delivery are allowed by Amendment No. 1 to Maximum Price Regulation No. 112, Pennsylvania anthracite, issued last week by OPA.

Amendment issued in recognition of the advantage to both producer and consumer of long-term contract transactions. Contracts providing for deliveries over a year, or longer, are common in the coal industry, usually containing open prices or adjustable price provisions.

Typewriter Conversion Order Clarified by War Board

WPB has issued an interpretation of its typewriter industry conversion order to clear up the status of privately operated plants or shipyards controlled by the Army, Navy or other government agencies engaged in financing output of war supplies.

Under the interpretation, No. 2 of Conversion Order L-54-a, WPB will not make new standard or portable typewriters available to private plants or shipyards financed by or controlled by government agencies involved in procuring war material.

Privately operated plants or shipyards covered by the interpretation can obtain new typewriters only through the rationing system set up by the OPA.

The interpretation applies to plants or shipyards privately operated on a cost-plus-fixed-fee basis, as well as to those privately operated and financed or controlled by the Army or Navy, the Defense Plant Corp., the Maritime Commission, or any other government agency engaged in financing or sponsoring production of war supplies.

Production of Golf Clubs Curtailed by WPB Order

Production of golf clubs has been curtailed and soon will be stopped completely by WPB.

The order, L-93, cuts off the use of iron and steel, other critical metals, plastics and cork, in the manufacture of golf clubs after May 31. Meanwhile, limited production will be permitted.

Under the order, the amount of iron and steel that may be used in golf clubs during the remainder of April and May is cut to 50 per cent of average use for an equal number of days during 1941. Use of plastics, cork, and critical metals other than iron and steel in the production of golf clubs is prohibited, effective immediately. The use of iron and steel in the production of golf clubs must be terminated June 1.

The order immediately freezes all inventories of plastics, cork, and all metals, except iron, steel, gold and silver, in the hands of the golf club manufacturers. On June 1, stocks of iron and steel will also be frozen except for metal in completed clubs or authorized for use by the Director of Industry Operations.

Every modern soldier

BY the end of 1863, complaints from infantry in the field kept coming to Colonel Benton at the Springfield Armory. Cartridges dipped in tallow gathered grit, scoring rifle barrels, causing locks to jam in emergencies. Could the ordnance department find a way to lubricate bullets without covering the whole cartridge with sticky grease? The answer came from Albert Ball of Lamson & Goodnow — direct predecessors of Jones & Lamson. He produced a machine which put grooves in the bullets. The bullets were greased in these grooves, and the grooves covered by the end of the shell when loaded. Ever since then, service cartridges have been dry, and the bullets lubricated by grease in grooves which are not exposed until the cartridge is fired.

JONES &

Manufacturers of Ram & Saddle Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Automatic Opening Threading Dies and Chasers

Jones & Lamson 12″ Fay Automatic Lathe tooled to face, groove and cam turn automobile pistons.

AUTOMATIC THREAD GRINDERS

OPTICAL COMPARATORS

RAM TYPE UNIVERSAL TURRET LATHE

owes a debt to ALBERT BALL

ALBERT BALL'S solution of Colonel Benton's problem was neither the first nor the last of hundreds of such problems overcome by Jones & Lamson engineers and by their predecessors.

Ever since 1833, in the early shops at Windsor, and since 1888 in factories still expanding at Springfield, generation after generation of machine builders has been working in continuous succession. Through more than a century they built up an accumulation of knowledge that forms a background for the rapid, far-reaching developments that characterize the work of Jones & Lamson engineers.

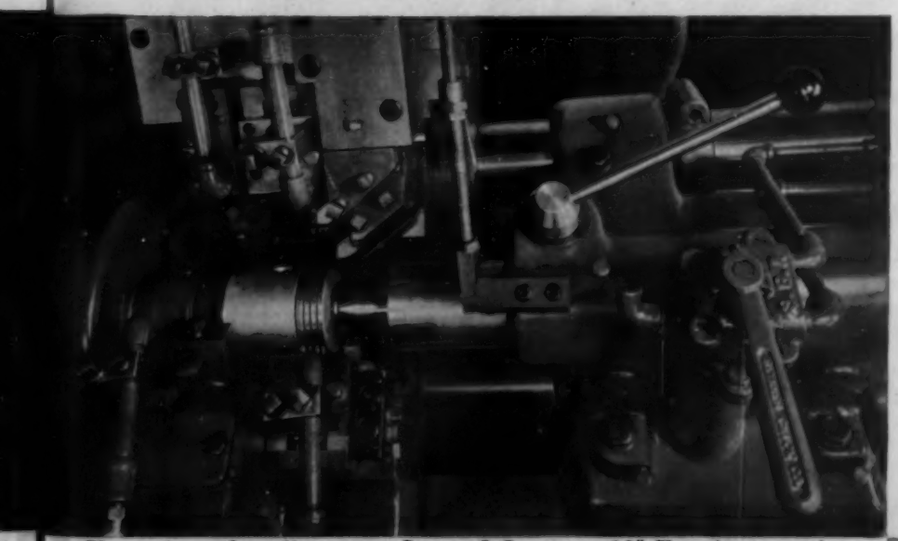
Thus today, Jones & Lamson engineers are called upon in turn to design and equip whole new factories for mass production — or to take the kinks out of a single job like the one pictured here.

Time is saved by cam turning while facing and grooving pistons on the Fay Automatic Lathe — grinding time is reduced to a minimum.

Whether your plant is large or small, your production problem big or little, it pays to write for help to Jones & Lamson engineers. With Jones & Lamson equipment you can meet today's wartime demands and still be ready for the hard years ahead. Illustrated catalogs are available.

LAMSON MACHINE COMPANY

SPRINGFIELD, VT., U. S. A.



Close view of tooling on a Jones & Lamson 12" Fay Automatic Lathe tooled to face, groove and cam turn automobile pistons.

PROFIT PRODUCING
MACHINE TOOLS

Metalworking Industry Advisory Committees Appointed by WPB

WASHINGTON

BUREAU of Industry Advisory Committees of the War Production Board has announced the formation of the following additional advisory committees:

Steel Warehouse

Government presiding officer, C. E. Adams, chief, Iron and Steel Branch.

Committee members: Guy P. Bible, Horace T. Potts Co., Philadelphia; C. H. Bradley, W. J. Holliday & Co., Indianapolis; Lester A. Brion, Peter A. Frasse & Co., New York; A. C. Castle, A. M. Castle & Co., Chicago; W. S. Doxsey, American Steel Warehouse Association, Cleveland; Sol Friedman, Reliance Steel Corp., Cleveland; Everett D. Graff, Jessie T. Ryerson & Sons, Chicago; Earle M Jorgensen, Earle M. Jorgensen Co., Los Angeles; W. Kurtz, Peninsular Steel Co., Cleveland; Richmond Lewis, Charles C. Lewis Co., Springfield, Mass.; N. R. Patterson, Patterson Steel Co., Tulsa, Okla.; J. H. Peebles, Peden Iron & Steel Co., Houston, Tex.

Metal Window

Government presiding officer, John L. Haynes.

Committee members: J. A. Sargent, Truscon Steel Co., Youngstown, O.; Frank Garratt, Hope's Windows Inc., Jamestown, N. Y.; Clark Robertson, Crittall-Federal Inc., Waukesha, Wis.; Eugene Bogert Jr., The Bogert & Carlough Co., Paterson, N. J.; Loring Washburn, S. H. Pomeroy Co. Inc., New York; C. A. Raquet, Detroit Steel Products Co., Detroit; F. A. Mesker, Mesker Bros. Iron Co., St. Louis; E. L. Soule, Soule Steel Co., San Francisco; D. Lawrence Carlson, Lundell-Eckberg Mfg. Co., Jamestown, N. Y.; C. R. Wilkins, Rolscreen Co., Pella, Iowa.

Pulp, Paper Machinery

Government presiding officer, L. S. Greenleaf.

Committee members: Elmer H. Neese, Beloit Iron Works, Beloit, Wisconsin; Homer W. Martindale, Black-Clawson Co., Hamilton, O.; S. Harley Jones, E. D. Jones & Sons Co., Pittsfield, Mass.; Leonard J. List, Samuel M. Langston Co., Camden, N. J.; Walter L. Barker, Improved Paper Machinery, Nashua, N. H.; William Buchanan, Appleton Wire Works, Appleton, Wis.; William W. Bolton, Emerson Mfg. Co., Lawrence, Mass.; Samuel J. Campbell, Hudson Sharpe Machinery Co., Green Bay, Wis.

Warm Air Furnace

Government presiding officer, W. W. Timmis.

Committee members: H. S. Sharp, Henry Furnace & Foundry Co., Cleveland; Cliff Ackerson, Agricola Furnace Co., Gadsden, Ala.; W. L. McGrath, Williamson Heater Co., Cincinnati; L. R. Taylor, International Heater Co., Utica, N. Y.; Frank C. Packer, Payne Furnace and Supply Co., Beverly Hills, Calif.; A. W. Wrieden, Lennox Furnace Co., Syracuse, N. Y.; R. S. McNanney, Dowagiac Steel Furnace, Dowagiac, Mich.; F. H. Faust, General Electric Co., Bloomfield, N. J.; Robin Bell, Surface Combustion Co., Toledo, O.

Fluorescent Lighting Fixtures

Government presiding officer, J. L. Haynes, chief, Building Materials Branch.

Committee members: Arthur Miller, The Miller Co., Meriden, Conn.; W. P. Lowell Jr., Hygrade Sylvania Co., Salem, Mass.; Joseph Markel, Markel Electric Products Inc., Buffalo; Nathan H. Eglowstein, Fluores-O-Lite Mfg. Co., Newark, N. J.; E. C. Huerkamp, Westinghouse Electric & Mfg. Co., Cleveland; Ward Harrison, General Electric Co., Cleveland; A. K. Wakefield, F. W. Wakefield Brass Co., Vermilion, O.; Thomas G. Beckett, Beckett Electric Co. Inc., Dallas, Tex.; R. W. Staud, Benjamin Electric Mfg. Co., Des Plaines, Ill.; Leon F. Moore, Electrical Products Consolidated, Denver.

Tracklaying Tractor

Government presiding officer, William Parish. Committee members: E. B. English, Caterpillar Tractor Co., Washington; M. L. Noel, Allis Chalmers Mfg. Co., Milwaukee; W. E. Miles, Cleveland Tractor Co., Cleveland; Neal Higgins, International Harvester Co., Chicago.

Office Machinery

Government presiding officer, N. G. Burleigh, chief, Industrial and Office Machinery Branch.

Committee members: Carl W. Brenn, Autographic Register Co., Hoboken, N. J.; Harland W. Rippey, Bircher Co. Inc., Rochester, N. Y.; Lawrence V. Britt, Burroughs Adding Machine Co., Detroit; T. B. Hirshberg Jr., Check-O-Meter Sales Co., Chicago; Ralph C. Coxhead, Ralph C. Coxhead Corp., New York; Merrill B. Sands, Dictaphone Corp., New York; Theodore W. Robinson Sr., Ditto Incorporated, Chicago; Harmon P. Elliott, Elliott Addressing Machine Co., Cambridge, Mass.; Carl M. Friden, Friden Calculating Co. Inc., San Leandro, Calif.; Thomas J. Watson, International Business Machines Corp., New York; Norman Sheras, A. D. Joslin Mfg. Co., Manistee, Mich.; Stanley C. Allyn, National Cash Register Co., Dayton, O.; C. G. Watkins, Simplex Time Recorder Co., Gardner, Mass.; W. J. Bernart Jr., Pitney-Bowes Postage Meter Co., Stamford, Conn.

Postpone Date for Filing Reports on Rough Diamonds

Because of delay in printing necessary forms, the filing date for reports on rough diamonds required by Order M-109 has been postponed to April 30.

The order requires reports on Form PD-376 by all persons who had title, possession or control of 10 or more carats of rough diamonds on March 31.

The order does not apply to cut or polished gem diamonds or to rough diamonds embodied in tools now in use.

The reports are returnable to the War Production Board, Chanin building, New York.

Used Electric Generating Equipment, Boilers Frozen

Used electric generating equipment and used steam boilers have been frozen by the WPB. Action was taken to promote efficient use of such equipment in the war effort, when it becomes available.

Dealers in such equipment have been notified that they may not sell, lease or option used electric generating equipment or used steam boilers without specific authorization from the Director of Industry Operations. The order, L-102, extends the prohibition to cover all persons with such equipment in their possession.

"Used electrical generating equipment" is defined in the order to mean any used or reconditioned stationary steam-turbine generator unit. "Used steam boiler" is defined as any used or reconditioned stationary steam generating boiler. Equipment which has an actual or market value of less than $1000 per unit is exempt from the terms of the order.

Broader Priority Assistance Assigned for Mining Machinery

Broader application of priority assistance for the production of mining machinery and equipment is provided by amendments to Preference Rating Order P-56-a.

As originally announced on March 3, the order permitted the assignment of ratings only for material to be delivered to operators as defined in Preference Rating Order P-56, the general mine order.

Amendments will permit companies using ratings assigned by P-56-a to make deliveries to South American copper companies operating under Preference Rating Order P-58, to iron and steel producers under P-68, to smelters under P-73.

Upon application, special permission may also be given by the Director of Industry Operations for deliveries of material obtained by use of ratings assigned under P-65-a to fill other rated orders.

Manufacture of Electrical Appliances Further Curtailed

WPB last week further restricted the production of electrical appliances. It issued an amendment to order L-65 providing a further reduction in the number of electrical appliances that may be made before production must cease altogether on May 31, and providing tighter restrictions on the metals that may be used in the appliances that may be manufactured under the order.

Original order permitted manufacturers to produce, between the issuance date and May 31, appliances having a factory sales value up to 25 per cent of the factory sales value of their products in 1941, exclusive of orders having ratings of A-10 or higher.

Last week's amendment reduces the production permitted under the order to 20 per cent of factory sales value in 1941, exclusive of A-10 and higher orders.

Heavy, Medium Truck Production To Be Halted When Quotas Are Filled

WASHINGTON

ALL production of medium and heavy trucks for civilian use will be discontinued after existing quotas have been completed.

Thus, another large segment of the automotive industry must convert its facilities to the output of war weapons. Production of passenger cars and light trucks was halted Feb. 1.

The stop-production order, Supplementary General Limitation Order L-1-e, applies also to off-the-highway vehicles for civilian use. These are heavy, rubber-tired vehicles too large for ordinary highway travel and used principally in construction and mining operations.

Can't Be Equipped with Tires

Chief reason for the production ban is the shortage of rubber. No tires are available. Therefore, it is necessary to restrict future production to that required for the Army and Navy, certain government agencies, the United Nations, and lend-lease operations.

Trucks produced between now and the time permitted for cleaning up present quotas will automatically be frozen under General Conservation Order M-100, which put into effect the truck rationing plan now being administered through the joint facilities of WPB and the Office of Defense Transportation.

Under Supplementary Limitation Order L-1-f, producers of medium trucks (weighing from 9000 to 16,000 pounds) will have until April 30 to complete production quotas fixed for February. After that date, further production for civilian use must be halted since quotas originally established for March were canceled.

Producers of heavy trucks (weighing 16,000 pounds or more) will have until May 31 to clean up amended March quotas. Then civilian output must cease. These trucks cannot be equipped by the manufacturer with tires, casings or tubes.

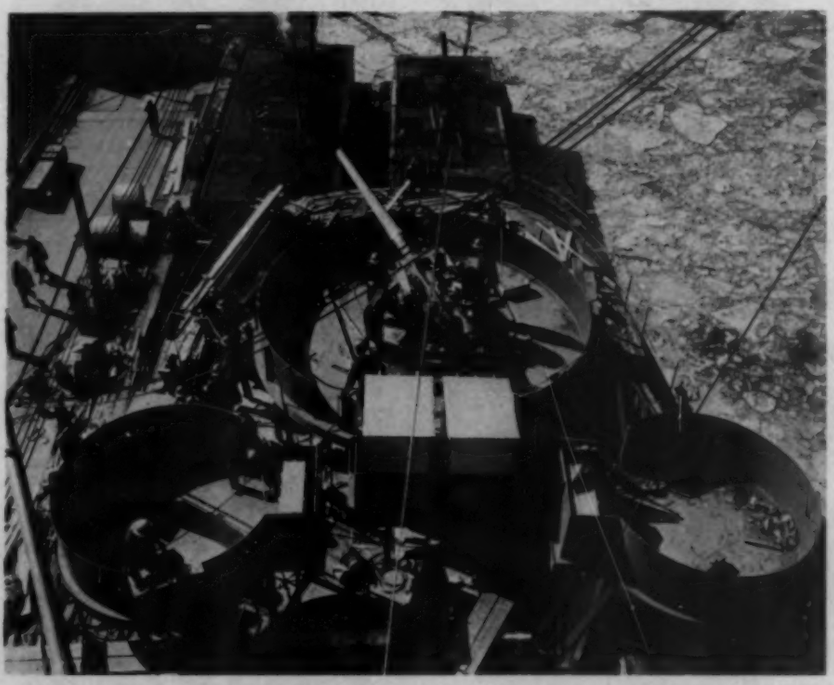
When production ceases, it is estimated that 97,070 medium and heavy trucks will have been produced for civilian use since Jan. 1, as compared with an output of 88,085 medium and heavy trucks during the first three months of 1941.

Off-the-highway vehicles weighing 24,000 pounds or more produced under March quotas may be equipped with tires and tubes only if they are specially designed to transport materials or equipment on mining, construction, logging or petroleum development projects.

An A-3 preference rating for materials going into the production of medium, heavy and off-the-highway trucks will continue to be made available under Limited Preference Rating Order P-54.

The stop-production order does not apply to output of truck trailers, bodies or passenger carrier buses of certain types.

Arming Merchantmen with Larger Guns



FINAL mechanical adjustments are made on a heavy gun just installed on a merchant vessel in a shipyard "somewhere in the United States." Gun and crew are protected by a steel emplacement. Official Navy photo from NEA

Industrial Camouflage Described In OCD Booklet

Camouflage methods for industrial plants, railroad yards, airfields, routes of communication, conspicuous landmarks and transportation systems are described in an illustrated 68-page booklet entitled *Protective Concealment* issued by the Office of Civilian Defense.

Booklet was prepared by the War Department under direction of the Chief of Engineers, U. S. Army, with suggestions of the National Techno logical Civil Protection Committee. Discussed are practical measures for concealment of important installations and equipment from aerial observation.

"Although an enemy may have accurate maps and photographs, he must rely upon visual identification of the target for accurate bombing."

Distribution of the booklet is restricted. Copies may be obtained from the Superintendent of Documents, Washington, for 25 cents each.

Civilian Use of Tin Further Restricted

Restrictions on the use of tin by civilians were tightened by WPB last week and eased for certain uses by the military services.

Amendment No. 2 to Order M-43 restricts all persons except retailers from selling any solder with a tin content of more than 16 per cent, any tin-bearing babbitt metal or tin oxide with these exceptions:

On a preference rating of A-9 or higher.

On a preference rating of A-10 or higher where the purchase order specifies that the material is to be used for maintenance or repair of existing equipment.

For manufacture of tin cans within the definitions of Conservation Order M-81, regulating the production and use of tin cans.

Amendment No. 2 to M-43-a removes limitations on the uses of tin for the manufacture of implements of war. These are defined as combat end products, including, but not limited to, aircraft, ammunition, armament and weapons, ships, tanks, vehicles, and parts to be incorporated in them.

Scarcity of Men, Metals Challenges Ingenuity of Machine Tool Builders

CHICAGO

PROBLEMS concerning scarcity of materials and of skilled labor at a time when production must be pushed to new heights drew attendance of 340 to the fortieth spring convention of National Machine Tool Builders' Association, April 13-14.

Speakers included William H. Harrison, director, production division, War Production Board, Washington; George C. Brainard, chief of the tools branch; Howard W. Dunbar, assistant chief, tools branch; and Geoffrey W. Smith, counsel, War Production Board; George H. Johnson, president of the association; Tell Berna, general manager; Mrs. Frida F. Selbert, secretary; Edward C. Bullard, treasurer of the association; and Ralph E. Flanders, president, Jones & Lamson Machine Co.

While Mr. Harrison said that production at present is about as good as reasonably could be expected, demands constantly are developing in unexpected directions. Consequently, there is no such thing as being able to say that the situation is good enough. It must be improved just as fast as possible and there still is room for longer hours in the machine tool industry.

Mr. Johnson, who is president of Gisholt Machine Co., emphasized this point when he said: "It is of little consequence to explain why the desired objective is difficult of accomplishment. All the reasons which any one of us might bring forward to explain why some of our machines are idle eight hours out of 24—or on Sundays—would seem pitiful to an American private helping to hold Corregidor. The fact is that we in this industry must do what it seems impossible to do. We must get and hold 168-hour operation."

Regarding the materials situation, Mr. Johnson reported as follows: "The War Production Board has requested our foundries to stop using nickel in castings. This is only a forerunner of drastic reduction of all the other vital alloy metals such as vanadium, tungsten, molybdenum, chromium, manganese, etc., in products not actually used by the armed forces. Already excellent results in reducing use of aluminum have been achieved.

"Continuation of occupational deferment from the draft by no means is assured," continued Mr. Johnson. "Therefore, we must begin right now to consider employment of women in our industry. We are told that already in England and in Canada, as high as 60 per cent of machine operators in factories are women. Our own chief engineer, who recently returned from inspecting Canadian munitions plants, tells me that women there are operating planers and boring mills.

"Bear in mind that employment of women requires its own special setup with respect to plant supervisory personnel and welfare facilities. In addition, the various states and the federal government have set up for women an entirely different set of employment laws than those which govern employment of men. However, it is my firm opinion that before this war is over, most machine tool builders will employ large numbers of women. Then we will be particularly grateful to our designers and engineers for having contrived machine tools whose operation involves the use of push buttons and easily handled levers rather than exercise of great muscular strength."

Other subjects discussed included machine tool allocations, speeding up of paint work and saving of materials connected therewith, and use of simplified machine tools.

Closely related to the latter are such expedients as the use of ordinary lathes for small boring jobs. One of the speakers mentioned that in one plant which he visited lathes rigged up with work tables on their beds not only were boring single holes efficiently but in some cases had special attachments which made it possible to bore several holes at once. Only through ingenuity such as this can the shortages in critical machines such as horizontal boring mills be met.

Ohio NYA Shops Train 2400 Every 60 Days

THIS war production training shop of the National Youth Administration in Columbus, is one of eight recently opened in Ohio. The eight shops represent an investment of about $680,000, will train 2400 war workers every 60 days in preliminary production-type work, including machine shop, welding, sheet metal and short wave radio. NEA photo

Reviews Steel Literature

Carnegie Library of Pittsburgh has issued its annual review of iron and steel literature for 1941. Edited by E. H. McClelland, technology librarian, it is a classified list of more important books, serials and trade publications issued during the year, with a few of earlier date not previously announced. The list includes only separately published books and pamphlets. No attempt is made to list material included in current periodicals.

Women To Be Called to Shops as War Labor Force Is Expanded

NEW war workers must be recruited mainly from women not normally in the labor force. This is the consensus of employment authorities after analyzing the production job to be done and the probable deletion of the present labor force through military inductions.

To determine the size of this potential labor source, the National Industrial Conference Board, New York, has broken down census data to reveal the occupational status of women, by states and sections.

The board's figures show a total of 50,360,000 women over 14 years of age in the United States a year ago. Of these, 28,550,000, or 56.7 per cent, were engaged in their own housework; 12,850,000, or 25.5 per cent, already were in the labor force; about 9 per cent was in school and another 9 per cent were unable to work or were of unknown status.

New war workers must come largely from the group now engaged in their own housework and by transfer of some of those now in the labor force from less essential work.

Labor Division of the War Production Board has estimated that three to four million women workers, possibly more, will be drawn into war industries this year.

Proportion of women workers was largest in the industrial areas, the board's analysis shows. Slightly more than 31 per cent of the labor force in the New England states was made up of women, compared with only 19.9 per cent in the Mountain states.

Analysis of the occupational status of women in nine of the larger states follows:

(In Millions)

	In Labor Force	In Own Housework	In School	Unable To Work
New York	1.70	2.87	0.44	0.50
Pennsylvania	0.97	2.2	0.36	0.31
Illinois	0.85	1.78	0.25	0.27
California	0.73	1.52	0.24	0.27
Ohio	0.64	1.61	0.25	0.23
Texas	0.54	1.40	0.22	0.19
Michigan	0.46	1.17	0.18	0.15
Massachusetts	0.56	0.89	0.15	0.18
New Jersey	0.52	0.89	....	0.16

To produce the forty billion dollars worth of war materials asked by WPB Chairman Donald M. Nelson will require a tremendous expansion of the labor force engaged in war industries. Gordon L. Hostetter, director of the Employers' Association of Chicago, makes the following estimates:

If the average work week continues at 43.1 hours—last year's figure in war industries — 17,880,000 workers will be required, compared with only 5,600,000 in 1941. If the work week is stepped up to 50 hours, 15,380,000 will be needed, and if the work week can be increased to 60 hours, 12,500,000 will be required.

"We shall have to employ women by the hundreds of thousands, if not millions, in jobs where women have never been thought of before," Mr. Hostetter says.

"Eye Accidents Rob U.S. Of 9,500,000 Man-Days"

Industrial eye accidents during 1941 robbed America of approximately 9,500,000 man-days—enough working time to have built 17 destroyers—according to Ira Mosher, vice president, American Optical Co., Southbridge, Mass.

Reporting an increase of 1,000,000 lost man-days during 1941 in comparison with 1940, he declared that 98 per cent of the 300,000 eye injuries which occurred are preventable. The direct and indirect cost of these accidents to the country, he said, totals $200,000,000.

◆

WOMEN are beginning to take jobs formerly considered exclusively men's work. Many will be employed at the new Ford bomber plant at Willow Run, Mich., where some already are at work as shown in accompanying photos. Above, three operators are running automatic riveters, while at right others are performing spot welding operations. NEA photos

◆

Courtesy of General Electric Company

with this new heat-treating process!

Schedules for hardening machine parts often call for these 9 operations: Haul, copper-plate, haul, locally remove copper, haul, pack, carburize and harden, haul, straighten. And often more.

Now, with the revolutionary new TOCCO machine, hardening can be cut to *one simple, high-speed, electric operation*—a push-button start with the entire heating and quenching job *controlled automatically*, precisely — completed in seconds, formerly hours. *Doesn't require skilled labor.*

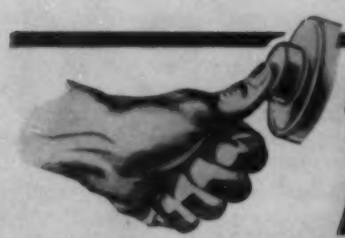
Compact, clean and cool, the TOCCO machine can be spotted right in the assembly line to eliminate hauling. It is *standard*—can be adapted to peace-time jobs by simply changing work fixture.

Faster heat-treating and fewer operations mean greater production! Users report TOCCO increases output 200% to 600%.

Find out how TOCCO can increase *your* heat-treating production!

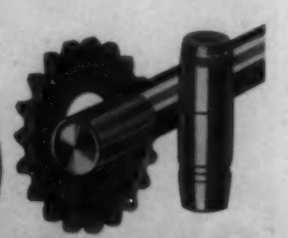
THE OHIO CRANKSHAFT COMPANY
Cleveland, Ohio

SPEEDY ELECTRIC HEAT IS GENERATED WITHIN THE SECTION TO BE HEAT-TREATED



TOCCO

World's Fastest, Most Accurate Heat-Treating Process



Mirrors of *MOTORDOM*

Union willing to give until it hurts—the other fellow . . . Would like to have everything frozen except wages . . . Pressure applied for more buses to transport working forces to and from new war plants . . . Diesels dance cheek-to-cheek in tank power plant. Radial engines for tanks far from out of picture . . . Renegotiating more large war contracts as volume moves up

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

UNION labor in the automotive and aircraft industries, through the executive board of the UAW-CIO, has celebrated the dawn of spring and the opening of the baseball season by coming up with another "plan" for the nation, titled, "Victory through Equality of Sacrifice." Released last week in newspaper advertisements and pamphlets, the presentation has a distinctly professional touch, in contrast to the recently disinterred Reuther plan when it was first broached.

Stated to represent the views of 700,000 working people in war industries, the plan is calculated to be a give-and-take proposition—the union will "sacrifice" double-time pay for Sundays and holidays, even though these rights "have been won through decades of struggle," in exchange for which the following are asked: Control of profits on the basis of 3 per cent return on invested capital; restriction of all incomes to a maximum of $25,000 per year; rigid fixing of prices of food, rent, clothing and other necessities; rationing of all food, clothing, housing and other necessities; raising of wages to meet increased living costs; guaranteed living wage for dependents of men and women serving in the armed forces; moratorium on debts for the unemployed and for those in the armed forces; creation of a labor production division in the WPB to make suggestions for increasing war production; creation of an agency to make plans for postwar adjustment; and finally, dependent upon acceptance of all the foregoing, agreement to accept all wages for time over 40 hours per week in the form of nonnegotiable special defense bonds.

Program Sent to Capital

Where any equality of sacrifice exists between relinquishing an extra-pay provision which is utterly indefensible in full-time operations and the fairly complete regimentation of the national economy outlined is difficult to see, but there is the program. It is now being rushed to Washington for consideration and it seems entirely likely the plan will meet favorable response in administration circles.

As long as the UAW is asking for something, there are a few other points which might be tacked onto the requests, even to use just as "traders." For example:

1. Mandatory closed union shop in favor of the CIO in all war plants.
2. Permission to all UAW-CIO members to purchase new automobiles and as much sugar as they wish.
3. Commissions in the Army or Navy to any CIO member of relative.

Problem of transporting working forces to and from outlying war plants in this district is becoming more acute as these plants approach the full production stage. An oral slugfest developed last week between the street railway commission, Ford representatives and labor representatives in connection with movement of workmen to the Ford Willow Run bomber plant. The company pointed out that 11,000 are now at work in the plant, with 4200 more on construction activities. Hiring is at a rate of 300-400 a day and by next month 17,000 will be at work. The plant is some 30 miles from downtown Detroit and as yet there is no adequate housing nearby. Investigation showed it impossible to develop commuter rail service to the plant, and before long worn-out tires are going to immobilize many private cars, so buses are apparently going to have to carry the bulk of plant workmen. The railway commission finally has decided to purchase 500 new buses, but the question remains whether any of them will go into service to Willow Run.

Irked at the commission's delay in buying new buses, a Ford representative pointed out that his company is still building seven buses a day and has enough material on hand for 300 more, with priorities to continue for six months at a rate of 35 buses a week. He told the commission that if it would not provide service immediately to Willow Run, the company might be forced to set up its own service.

Some of the large haulaway trucks hitherto used to transport new cars to other cities are being converted into buses for emergency suburban transportation. They can be altered at low cost and will carry an appreciable number of workmen, though not in the finest style. This type of transportation has been suggested in Flint, Mich., to transport workmen to the new tank arsenal outside the city.

Diesel Tank Engine Goes Into Volume Production

Though it is said to be still awaiting approval by the ordnance department, the double 6-cylinder diesel engine designed by General Motors for powering the M-4 medium tank is getting into volume production. The unit is an ingenious combination of two standard diesels, one turned end for end so that the accessories, including the large blower, can be mounted on the outside of each engine. The blocks are about 5 inches apart, with exhaust manifolds on the inside. A double clutch arrangement is provided at the driving end, which permits using either one or both of the 225-horsepower engines which are geared to a single power takeoff.

Advantages of the diesel power plant for tanks, as pointed out by the designers, include high torque at low speed, greatly extended cruising range with a given weight of fuel and minimized fire hazard compared with gasoline engines. A further recently discovered charac-

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teristic is that the diesels will operate equally well on gasoline. Disadvantages center principally around the much greater weight of the diesel compared with the radial air-cooled engine now used in medium and light tanks, the possible vulnerability of the cooling system on the diesel and the complicated supply problem occasioned by use of oil fuel.

It becomes apparent that there are at least two sharply different schools of thought regarding the type of power plant to be used in tanks, the radial engine having strong backers, in spite of all that has been said and written about its inadequacies in tank usage. A recent development in radials has been a lowering of the compression ratio to permit the use of 80-octane fuel, whereas formerly these engines had required aircraft fuel of 91-octane or better.

Walter Reuther of the UAW-CIO, in his recent oratorio with C. E. Wilson, president of General Motors, solved the tank power problem with a wave of the hand and the statement that present and proposed tank engines should be thrown out altogether and the Ford 8-cylinder aircraft-type engine standardized for this application. Only a handful, if that many, of these engines has been built, none tested extensively in tank operations, and volume production is months away. Meanwhile the tanks are rolling from assembly lines and they cannot very well be kept standing around waiting an unproved engine.

Renegotiation of War Contracts Probable

Start of what promises to be a fairly complete re-examination of government war contracts for the purpose of renegotiation was the conference between military procurement officials and Continental Motors, which operates plants here and in Muskegon, Mich., building a variety of aircraft-type engines, parts and related items for the war program. Upshot of the "guinea pig" study made on Continental was a renegotiation of its present contracts on the basis of material and labor costs, burden, amortization of investment and a reasonable profit in the light of greatly increased volume, resulting in a reduction of $40,000,000 on these contracts which amount to several hundred millions.

A score or more of companies supplying war products are slated to follow through a similar recheck and renegotiation of contract prices. In prospect appears a limitation of profits to 3½ per cent when plant facilities are government financed, 8 per cent when those facilities are privately financed.

Renegotiation of many contracts is the natural outgrowth of the expansion of such contracts from small-lot educational orders to high volume. As volume of output increases, costs go steadily downward, in some cases amazingly so. Most industrial executives are perfectly willing to renegotiate such contracts and in fact often initiate such renegotiations. No one knows better than the automobile industry the effect of high volume on unit costs.

The operator of a medium-size castings plant here, devoted fully to war work, summed up the situation approximately as follows: "Our labor and material costs are up appreciably, our labor productivity is down, and our price per pound of output is down from the peacetime level. Nevertheless our total volume is three times what we ever dreamed it could be, so we just can't help making a good profit. And after the starvation years of the thirties in our business we feel we are entitled to a decent profit now."

Starts Bond Sale Drive

Nation-wide drive for sale of war bonds to its 220,000 employes in 87 war production plants was launched by General Motors last Thursday. Objective is 100 per cent employe participation and all the devices of promotion and publicity are being used. Three initials of the slogan, "Save and Serve for Victory," appeared on floors and walls of all GM plants two weeks ago to stimulate interest of employes in the drive. Special award banners will be given to plants and offices enlisting 100 per cent participation.

Machine tool and production equipment listing service of the Automotive Council for War Production has classified 80,000 surplus machines available throughout the industry, and has 45,000 more units awaiting classification. Of those tabulated, 50,000 are already operating on war work. About 200 companies in the industry have listed their surplus equipment, exclusive of 84 companies which reported their facilities 100 per cent engaged on war production.

Extension of financial aid to dealers of Nash-Kelvinator Corp. by the parent company began last week with a cash advance of about $450,000, which would indicate 45,000 new cars in dealers' hands, since the advance is made on the basis of $10 per month per new car. This figure is reduced somewhat, however, since dealers may elect to receive payments for the months of February and March in the initial disbursement.

Old Roll Forging Machine Does Its Bit

TWENTY-FIVE-year-old roll forging machine, once used to form gear shift levers, has been resurrected by Chrysler Corp., Detroit, and fitted with a new set of rolls to size aluminum alloy rounds preparatory to forging on steam hammers for aircraft parts. Sizing the bars saves hours over working them down on the anvil of the steam hammer

STAMCO
Engineers
are ready to
serve you.

•

Lay your shearing problems at STAMCO'S door

Your problems are our problems. Stamco's "open door" policy gives you the advantage of experience and knowledge gained by more than 55 years of the manufacture and the application of special rolling mill machinery. Just telegraph, telephone or come to Stamco for the correct answer.

The STREINE TOOL & MANUFACTURING COMPANY

MEN of INDUSTRY

W. V. PETERS has been elected vice president and a director, Truscon Steel Co., Youngstown, O., subsidiary of Republic Steel Corp. He succeeds **Kenneth D. Mann,** who has resigned to serve under **Gen. Brehon Somervell,** Services of Supply Command, United States Army, Washington. Associated with Truscon 19 years, Mr. Peters heretofore has been sales manager. **C. B. McGehee,** formerly manager of sales, southern area, has been named general manager of sales.

♦

James K. Fulks, associated with Ex-Cell-O Corp., Detroit, 17 years, serving in various capacities, since November, 1940, as factory manager in charge of Ex-Cell-O plants, has been elected vice president in charge of manufacturing.

♦

H. S. Eberhard, vice president, Caterpillar Tractor Co., Peoria, Ill., has been elected a director, to succeed the late D. G. Sherwin.

♦

Perry V. Ogden has been appointed factory manager and general superintendent, Boeing Aircraft Co., Seattle. From 1928 to 1934 he served as the company's production chief.

♦

Dr. Paul Martens has retired as manager of Metal & Thermit Corp.'s plant at Carteret, N. J., after completing 33 years of active service.

♦

A. V. Murray, secretary, Scaife Co., Oakmont, Pa., has been elected executive vice president. **R. G. Taylor** has been chosen secretary, and **R. W. Thrasher** has been named plant superintendent.

♦

Wallace K. Brown has been appointed vice president in charge of procurement, Crocker Wheeler Electric Mfg. Co., Ampere, N. J. Associated with the company since 1908, he has since served as district manager in San Francisco and Newark, eastern sales manager in New York, and vice president and general sales manager.

♦

W. D. Fisher has been appointed sales representative and tool engineer in the Detroit district for McKenna Metals Co., Latrobe, Pa. Formerly associated with Vanadium Alloys Steel Co. as sales representative, Mr. Fisher will have headquarters at 14302 Grand River avenue, Detroit.

W. V. Peters

James K. Fulks

Wallace K. Brown

♦

W. G. Merowit, 436 Niagara street, Buffalo, has been named representative in western New York state by Mahr Mfg. Co., Division of Diamond Iron Works Inc., Minneapolis.

♦

John M. Hassler, chief industrial engineer at Birmingham, Ala., for Republic Steel Corp., has become associated with Consolidated Aircraft Corp., Fort Worth, Tex., as superintendent of industrial relations.

♦

Clarence Tolan Jr., president, Dodge Steel Co., Philadelphia, and **William C. Carter,** executive vice president, Link-Belt Co., Chicago, were elected directors of Link-Belt at the annual meeting of stockholders recently.

♦

Frank A. Hiter, vice president and general sales manager, Stewart-Warner Corp., Chicago, has been elected a director, replacing **Thomas T. Sullivan,** retired.

♦

Alexander M. Hamilton has been appointed executive vice president in charge of the Canadian Tank Arsenal operated by Montreal Locomotive Works Ltd., Montreal, Canada, an affiliate of the American Locomotive Co.

♦

David F. Robinson, New York district sales manager, William Sellers & Co. Inc., has been granted leave of absence for the duration, and is now working under **Commander Paul E. Piehl,** United States Navy Aeronautics Bureau, Washington.

♦

Frederic I. Lackens, advertising manager, Hays Corp., Michigan City, Ind., has been appointed vice president, National Industrial Advertisers Association, Chicago, to fill the unexpired term of **Louis Ott,** advertising manager, Ohio Brass Co., who resigned.

♦

Gaston Estep, cost analyst in the Chicago office of Carnegie-Illinois Steel Corp., has been transferred to Pittsburgh as assistant chief cost analyst. He has been succeeded by **James Thomson,** formerly cost analyst at the Gary works. **James W.**

Kettle, industrial engineer at Gary works, has become cost analyst in the plant, succeeding Mr. Thomson.

♦

P. W. Stansfield, since June, 1939, manager of farm service tire sales, B. F. Goodrich Co., Akron, O., has been given the added duties of directing the sale of industrial tires.

♦

C. H. Longman, assistant to the chief operating officer, Chicago & Northwestern railroad since 1940, has been named assistant chief operating officer.

♦

C. M. Self, executive assistant since 1939, Chicago, Indianapolis & Louisville railroad, Chicago, has been appointed chief operating officer.

♦

E. E. Wright, formerly assistant general manager, New York Central railroad, Detroit, has been appointed assistant to the vice president, with headquarters in Chicago. He is succeeded in Detroit by **Frank McElroy,** while **R. H. DeForest,** succeeds Mr. McElroy as superintendent of freight transportation at Jackson, Mich.

♦

Charles M. Craighead has been named a research metallurgist, Battelle Memorial Institute, Columbus, O. He formerly was associated with Aluminum Co. of America, Reynolds Metals Co., and Braeburn Alloy Steel Corp.

♦

Alfred S. Otton, advertising manager, Robins Conveying Belt Co., Passaic, N. J., has been relieved of his duties as advertising manager so that he may handle assignments in connection with war work. **John M. Lupton,** assistant advertising manager, has been promoted to advertising manager.

♦

Alfred Kent, formerly Dallas, Tex., representative for Manning, Maxwell & Moore Inc., Bridgeport, Conn., is now an ensign in the United States Navy.

Fred Crabbe, who formerly covered the Corpus Christi territory, has been transferred to Dallas replacing Ensign Kent for the duration.

♦

John M. Bush, land agent for Cleveland-Cliffs Iron Co. at Negaunee, Mich., has been appointed chairman of the Upper Peninsula industrial salvage committee by **Eugene duPont III,** assistant regional manager of the industrial salvage section, War Production Board.

♦

Marion P. Crews has been appointed representative at Dayton, O., for Boeing Aircraft Co., Seattle, Wash. The past year chief of the CAA's aircraft engineering division in Washington, Mr. Crews will serve as liaison man for all branches of the Boeing companies with the materiel division of the Air Corps.

♦

Warren S. Detenbeck, heretofore secretary, Fedders Mfg. Co. Inc., Buffalo, has been elected executive vice president and secretary. **William C. Winkler** has been named comptroller and **Paul C. Fedders,** assistant treasurer. **Edmund R. Walker,** formerly assistant general manager, was promoted to general manager. **Christ W. Fedders** and **C. H. Batchelor** have been re-elected vice presidents.

♦

Robert H. Ridgway has been appointed chief, Coal Economics Division, Bureau of Mines, Department of Interior, succeeding **F. M. Shore,** who has been promoted to assistant chief of the bureau's Economics and Statistics Branch. Mr. Ridgway has been in the Washington office of the Bureau of Mines since 1928.

♦

R. D. Scheldrup, associated with McGraw Electric Co., Toastmaster Products Division, Elgin, Ill., 15 years, has been appointed purchasing agent. He succeeds **P. D. Higgins,** who has become director of purchases, Mills Novelty Co.

Harry B. Davis, heretofore assistant to sales manager, succeeds Mr. Scheldrup as credit manager and traffic manager.

♦

Kenneth C. Jasper, tool supervisor, Westinghouse Ordnance Division, Louisville, Ky., was elected chairman of the newly organized Louisville chapter, American Society of Tool Engineers, at the recent charter meeting of the chapter. Other officers elected are: First vice chairman, **Frederick Brown,** president, Talking-Weighing Machine Co.; second vice chairman, **Fred W. Fieldhouse,** president, Fieldhouse Engineering Corp.; treasurer, **John Thomas,** general foreman, gun erection department, Westinghouse Ordnance Division; secretary, **Sauter F. Reichert,** foreman, brass tool department, American Radiator & Standard Sanitary Corp.

♦

Warren H. Clarke has been appointed assistant general manager, Houde Engineering Division of Houdaille-Hershey Corp., Buffalo. He succeeds the late Frank R. Schubert. Mr. Clarke formerly was Michigan state director of the War Production Board.

♦

H. J. McKenzie, heretofore president of Sterling Pump Corp., Hamilton, O., and Stockton, Calif., which has been acquired by the Peerless Pump Division of Food Machinery Corp., Los Angeles, and Canton, O., has joined the Peerless organization as assistant to **Vernon Edler,** vice president and general manager. **Fred Jones,** manager of Sterling's New York office, will continue with Peerless; **John Mikesell,** formerly engineer for Sterling, will become manager of Sterling and small products line; while **Jack Wade,** Sterling's chief engineer, will be in charge of new developments at the Canton plant. Other employes of Sterling will be retained in the Peerless organization.

♦

William D. Reed has been appointed general manager of sales, Sawhill Mfg. Co., Wheatland, Pa., and will supervise sales of tubular products of all kinds. The past three years Mr. Reed has been associated with the Chicago district office of Republic Steel Corp.

♦

H. E. Doughty has been named assistant sales manager, Jessop Steel Co., Washington, Pa. He joined Jessop in 1932 and formerly was district manager at Philadelphia.

♦

H. S. Worthington, general superintendent of the Pittsburg, Calif., works of Columbia Steel Co., has been appointed assistant vice president in charge of operations, with offices in San Francisco. He will be succeeded by **Joseph A. White,** heretofore assistant general superintendent. **J. D. McCall,** assistant general superintendent at Torrance, will become assistant to Mr. White, and his post at Torrance will be filled by **Harlow Dotson.**

♦

Charles J. Hardy has been elected chairman of the board and **Leslie E. Hess,** president, J. G. Brill Co., New York. Other officers elected are: **Charles O. Guernsey** and **Ronald R. Monroe,** vice presidents; **Edmund L. Oerter,** secretary-treasurer; **J. W. Robb** and **B. D. F. Baird,** assistant treasurers; and **H. F. McKillip,** assistant secretary.

♦

V. A. Crosby, Climax Molybdenum Co., Detroit, has been elected chairman, Detroit chapter, American Society for Metals, succeeding **L. C. Massey,** Dodge Division of Chrysler Corp. **Earl L. Morrison,** Budd Wheel Co., is the new vice chairman, and **A. Di Giulio,** Bundy Tubing Co., has become secretary-treasurer.

Executive committee includes **Roy W. Roush,** Timken-Detroit Axle Co.; **I. A. Rohrig,** Detroit Edison Co.; **A. H. Smith,** Republic Steel Corp.; **W. W. Gilbert,** University of Michigan; **E. O. Kirkendall,** Wayne University; **W. G. Patton,** Climax Molybdenum Co.; **H. L. Grange,** General Motors Research Laboratories; **L. C. Dunn,** E. F. Houghton & Co.; **Glenn Coley,** Detroit Edison Co.; **E. H. Stilwill,** Chrysler Corp.

DIED:

George L. Norris, 76, chief metallurgist, Vanadium Corp. of America, New York, April 13, in that city. He was one of the pioneers in the development and application of vanadium. He joined American Vanadium Co. in 1909, and remained with the company when it became the Vanadium Corp. of America. He was a member of American Society for Testing Materials, American Society for Metals, Society for Automotive Engineers, American Institute of Mining and Metallurgical Engineers, American Iron and Steel Institute and British Iron and Steel Institute.

♦

Abel E. Peterson, 53, production manager, Watson Mfg. Co., Jamestown, N. Y., April 7, in that city.

♦

George H. Keusch, 60, district freight agent, Canadian Pacific railroad, Chicago, April 8, in that city.

♦

S. Forry Laucks, 72, president, York Safe & Lock Co., York, Pa., at his home in Wrightsville, Pa., April 11. Born in York county in 1870, Mr. Laucks had been with the company since he was 17. In 1938 he converted the company to the manufacture of ordnance, and the plant now is engaged 95 per cent in war work.

♦

Henry R. Carse, 76, president, Electric Boat Co., Groton, Conn., builder of submarines, April 13.

♦

Hugh Morton Craig, 52, director for heavy steel products, Iron and Steel Control, London, England, March 8.

♦

Charles E. Reinel, 66, manager, Madison, Wis., plant of Allis-Chalmers Mfg. Co., April 7, in that city. He had been with the company since 1896.

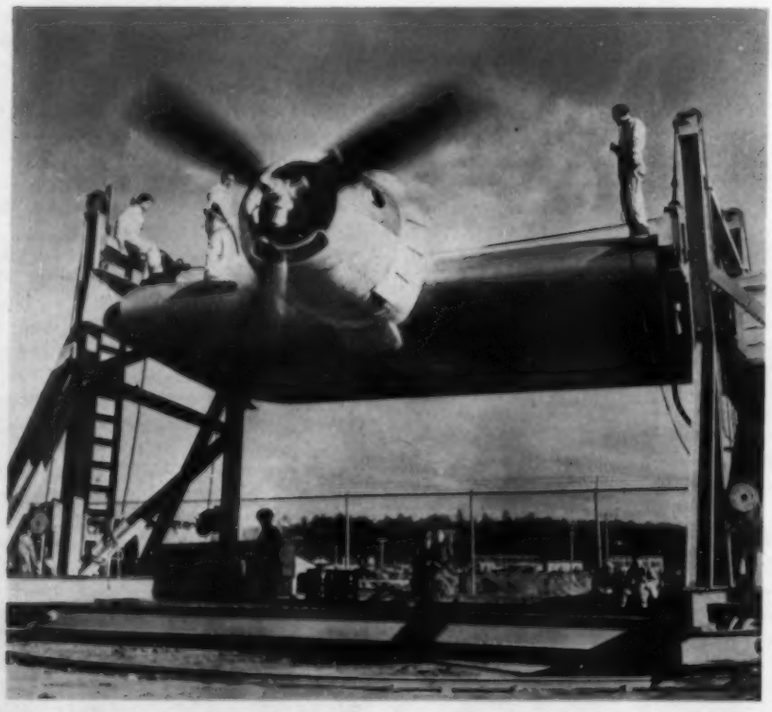
♦

George F. Blasier, 63, general superintendent, Buffalo Bolt Co., North Tonawanda, N. Y., April 9, in that city. He had a continuous service record of 36 years with Buffalo Bolt.

♦

Meade W. Patterson, assistant works manager in charge of production for the mill products division of the Bridgeport Brass Co., Bridgeport, Conn., April 8, in that city.

Tests Aircraft Engines on the Ground



ENGINE test laboratory at Boeing Aircraft Co's Seattle plant is designed to put airplane engines through rigid performance tests without taking them off the ground. Laboratory is mounted on a circular track, permitting the engine to be shifted to take advantage of wind from any direction. Through testing the power plants before they are installed in the plane, months of time are saved in getting new models into production. Corner of the control cabin where engineers carefully check all data may be seen at right in photo

MEETINGS

Foundry Show Preview Opened to Employes

Executives and employes of Northeastern Ohio foundries and allied industries are invited to attend the preview opening of the Foundry and Allied Industries Show to be held in connection with the annual convention of the American Foundrymen's Association, which opens in Cleveland, Monday, April 20. The show will be in Public Auditorium.

From noon Monday to 10 p.m. will be known as Northeastern Ohio Preview Day. Plant employes will be admitted without charge on that day only. Tickets may be obtained from the American Foundrymen's Association in the auditorium.

Scrap To Be Discussed At Cleveland Meeting

An invitational meeting on the general topic of "Salvage for Victory" is scheduled to be held April 20-23 in Hotel Carter, Cleveland, under the auspices of the Cleveland regional branch, Army Ordnance Department.

Among speakers on the formal 4-day program are Major General Campbell, of Washington, Army Ordnance Department, and Russell Whitman, OPA.

"Floating" Railroad Cars Demonstrated

Three new pendulum-type railway passenger cars were demonstrated to 150 railroad officials and the press in a run between Chicago and Galesburg, Ill., last week. Built by the Pacific Railway Equipment Co., Los Angeles, for the Chicago, Burlington & Quincy; Atchison, Topeka & Santa Fe; and Great Northern railroads, the cars possess an unusual degree of riding comfort, quietness and freedom from vibration.

Their design utilizes recent important developments of aviation and automotive engineering. Mounted at four corners on deep, soft coil springs, "floating" car eliminates much sway and lurching encountered in conventional type equipment operating at high speeds. Much like lightweight streamlined coaches, the new car is of "stressed skin" construction, the outer covering being of high tensile, low alloy steel, forming an integral part of the frame.

The demonstration was sponsored by the Chicago Association of Commerce and Burlington and Santa Fe railroads.

Activities of Steel Users and Makers

BRIDGEPORT Brass Co., Bridgeport, Conn., last Thursday put into operation its new brass mill at Indianapolis, the first of five major government brass mills to swing into production. The plant, three times the size of the Bridgeport rolling mill, will make brass at one end and deliver completed products at the other. Defense Plant Corp. holds title.

♦

Whiting Corp., Harvey, Ill., has acquired the Hydro-Clone line of dust and fume suppression equipment. E. F. Fisher, inventor of the Hydro-Clone equipment, is in charge of this department which is a part of the Equipment Division.

♦

A label pointing out that every empty steel drum lying idle means that steel needed for war production is diverted by requiring another drum to be used for shipment is now being placed on all its drums by Acheson Colloids Corp., Port Huron, Mich.

♦

A record installation of General Electric capacitors expected to be made within the next three months will permit existing facilities in a power pool of several companies centering around Houston, Tex., to deliver from 35,000 to 50,000 kilowatt additional power to important defense loads in that area, chief of which is the new magnesium plant at Freeport. They will be applied on the systems of Houston Lighting & Power Co., Central Power & Light Co., and Lower Colorado River Authority.

♦

Metallizing Co. of America has moved its Chicago general offices and midwestern warehouse to 1330 West Congress street.

♦

Udylite Corp., Detroit, has moved its eastern district offices and warehouse from 60 East Forty-second street, New York, to 11-16 Forty-fourth drive, Long Island City, New York. A complete line of electroplating and polishing supplies will be maintained there.

♦

Wickwire Spencer Steel Co., New York, has published an illustrated pamphlet entitled, "Something About Our Job in Helping to Win the War," to show its employes how the products they turn out are actually used in military combat. The pamphlet was also sent to stockholders, customers and suppliers of the firm.

♦

A booklet, "How One Company Tackles the War Production Problem," a case history of its recovery from lost peace-time production, is being sent to customers by the Lvon Metal Products Inc., Aurora, Ill. Planning and execution of a campaign to get both prime and subcontracts is outlined in the booklet.

♦

Pennsylvania Salt Mfg. Co., Philadelphia, chemicals, has arranged a contract with the government for construction and operation of a plant in the Philadelphia area for the manufacture of war goods. Cost will be $1,750,000.

♦

Appreciation for the co-operation of the Lincoln Electric Co., Cleveland, for providing welding instruction for ordnance inspectors was expressed in a letter signed by Maj. Gen. C. T. Harris Jr., assistant to the chief of ordnance, to J. F. Lincoln, the company's president. Lincoln Electric established a course of training for inspectors at its welding school at the request of the Ordnance Department. Primary purpose was to instruct inspectors of welding on tanks. The inspectors' course lasts two weeks, was started Jan. 19 and will continue until July 20. Fifteen are enrolled in each course.

White Metal Smelters Association Organized

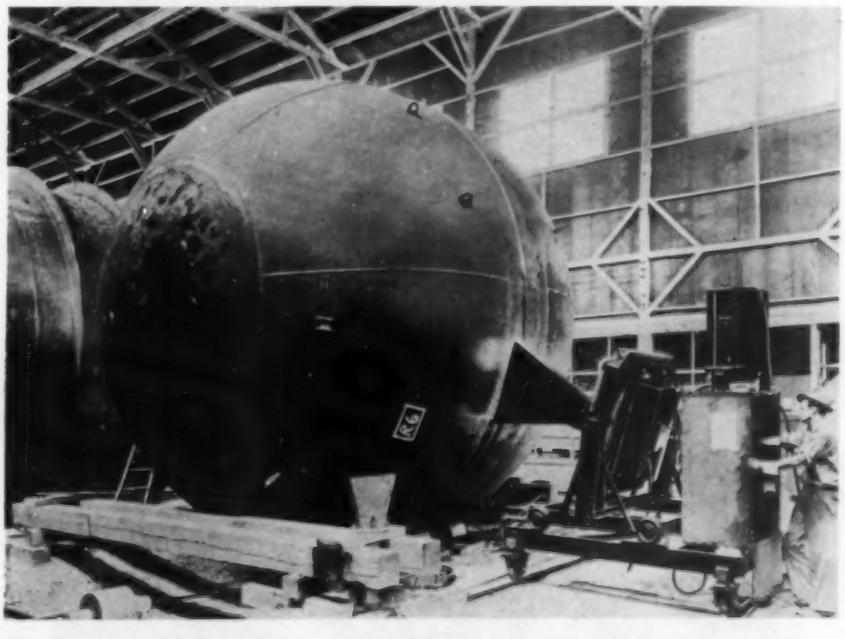
White metal smelters met in Chicago, April 12, and formed an organization known as the Associated White Metals Smelters of America. Purpose is "to assist the OPA and WPB in application and interpretation of their rulings."

The organization will acquaint the trade with a better understanding of the materials being handled by the industry, conservation of tin stocks and other critical materials, and use of materials which they handle for replacement of critical materials.

Albert Rothstein, Chicago, was elected chairman of the association; Harry S. Goldstein, Philadelphia, vice chairman; Oscar M. Pisof, 1720 North Elston avenue, Chicago, secretary; and Hyman Ferrer, Omaha, Neb., treasurer.

Composing the advisory panel, the list as issued follows: Herman Galamka, Kansas City, Kans.; Milton Silverstein, Chicago; J. M. Marks, Detroit; J. Kaplan, Chicago; Mr. Grodin, Cleveland; Walter Schoenbach, Chicago; R. Lippa, Chicago; Sidney Silverstein, Chicago; Whitney Sall, Los Angeles; Mike Helbein, Philadelphia; R. Robinson, Buffalo; Dan Hill, Lincoln, Neb.; Elmer Fisher, Chicago; Morris Wenzer, Chicago; Mr. Goose, Boston; Milton Levinson, Boston; Mr. Pelkies, St. Louis; Albert P. Goldberg, San Francisco; Alex Goldman, Seattle; Mr. Tessler, Denver; J. Viner, Richmond, Va.; and J. Schneider, Detroit.

Steel Plugs for Grand Coulee Inspected by X-ray



NO ORDINARY sink stopper is this 18-foot diameter steel plug which is being examined by means of a General Electric 200,000-volt X-ray unit before going into service at the Grand Coulee dam in Washington. All-welded plugs like this are being used to close off penstocks and pipelines not yet in operation. They are part of equipment built by Western Pipe & Steel Co., San Francisco

Chicago ASM Chapter Elects Dr. J. L. Burns

Dr. John L. Burns, Booz, Fry, Allen & Hamilton, management counselors, Chicago, and until recently manager, wire division, Republic Steel Corp., Chicago, has been elected chairman of the Chicago chapter, American Society for Metals, for the 1942-43 year. He succeeds W. D. McMillan, works metallurgist, International Harvester Co., Chicago.

Fred C. Smith, field metallurgist, Carnegie-Illinois Steel Corp., Chicago, was named vice chairman, and Andrew A. Engelhardt, sales, Eclipse Fuel Engineering Co., Chicago, secretary-treasurer.

Elected to the executive committee were: Lloyd J. Bohan, district sales manager, Michigan Products Corp., Chicago; Richard R. Hartwell, electrochemical engineer, American Can Co., Chicago; Arne Hedstrom, sales metallurgist, Vanadium-Alloys Steel Co., Chicago; Harry W. Highriter, chemist and metallurgist, Vascoloy-Ramet Corp., North Chicago, Ill.; C. T. Prendergast, engineer, Western Electric Co., Chicago; Fred J. Robbins, metallurgical engineer, Bliss & Laughlin Inc., Harvey, Ill.; Elmer E. Terwell, sales engineer, Driver-Harris Co., Chicago; J. C. Thompson, sales, Park Chemical Co., Riverside, Ill.; Dr. Stephen F. Urban, supervisor of research, Carnegie-Illinois Steel Corp., South Chicago, Ill.; and Retiring Chairman McMillan.

Value of U.S. Mineral Output up 18 Per Cent

Total value of mineral products in the United States in 1941 increased 18 per cent over 1940, according to preliminary data by the Bureau of Mines. The estimated value of $6,600,000,000 is the highest since 1920, and almost double that for 1934. A general advance in prices of metals accounted in part for the increased value but the major factor was the substantial gain in output of both metallic and non-metallic products. By the end of 1941 the war production program had raised the rate to unprecedented levels.

Estimated total value of metallic products in 1941 was $1,970,000,000, 17 per cent above that for 1940 and was exceeded only during 1917 and 1918. Non-metallics advanced to $4,630,000,000, an increase of 19 per cent over 1940 and the highest since 1926. Mineral fuels advanced 18 per cent to a value of $3,630,000,000, highest since 1920. Other non-metallics reached $1,000,000,000, an increase of 21 per cent over 1940, only slightly below the peak of the 'twenties when construction activities were substantially higher.

Manganese production in 1941 more than doubled that of 1940, bauxite output increased 107 per cent and manganese ore 89 per cent. Aluminum increased 50 per cent over 1940, molybdenum 38 per cent, mercury 16 per cent, zinc 12 per cent, lead 9 per cent and copper 8 per cent. Shipments of iron ore were 23 per cent higher. Gold production declined 0.8 per cent and silver 0.4.

ADDITIONAL COPIES AVAILABLE

IF YOU would like extra copies of this week's poster, entitled "You Are a Soldier of Industry", for use on your factory or office bulletin boards they are available from STEEL. Readers Service Department, Penton Building, Cleveland, Ohio.

Trapping the Sparks To Salvage Alloys from Grindings

ALLOY steel producers, who work with the more valuable and hard-to-get materials, watch closely their consumption of metals.

Allegheny Ludlum Steel Corp. is salvaging them from grindings produced in manufacturing operations.

The accompanying photograph shows a suction catcher trapping a shower of grindings from an alloy steel billet.

As a result of the company's research, special equipment and procedures have been developed. Even in recent peacetime years, all of the tungsten in grindings was captured and returned to the electric furnaces for remelting. The grindings from low-alloy steels were processed for reclamation, too, even though the expense of salvaging their alloys was disproportionate.

To increase its salvaging capacity, the company reports it is building a new reclamation plant which will concentrate on the processing of low-alloy steels to save the alloy content. To eliminate losses of these alloys until the new salvaging equipment is in operation in the near future, other concerns have contracted to supplement Allegheny Ludlum's present facilities for recapturing the strategic alloy particles from alloy steel grindings.

YOU ARE A SOLDIER OF INDUSTRY RACING AGAINST TIME!

".....one
extra s
make t
and de
fighti

"…..one extra plane or extra tank or extra ship completed tomorrow... may make the difference between life and death for some of our fighting men."

…..President Roosevelt

Canada Moves To Facilitate Steel Deliveries from U.S.

TORONTO, ONT.

TO ASSIST flow of materials from the United States to Canadian manufacturers working on war orders, regional offices will be established in main industrial centers by R. C. Berkinshaw, priorities officer. One has been opened at Vancouver, B. C., and one at Toronto, Ont. A third will be located at Halifax, N. S. Since adoption of the plan placing Canadian manufacturers on the same basis as those in the United States more serious shortages in many commodities have developed in the United States and a new series of regulations has been imposed.

The changeover and addition of new regulations has complicated the situation and many delays have been met in obtaining material under priorities. As many as 7000 applications for United States priorities have been handled in a single week.

War contracts placed and commitments made by the Department of Munitions and Supply and its predecessor bodies on Canadian, United Kingdom and other account to March 31, 1942, totaled $3,447,269,253, according to government figures just released. Contracts placed on Canadian account, including contracts executed for plants and plant extensions, a portion of which is chargeable to other Empire countries under the Air Training Plan, and other contracts amounting to $34,428,067 awarded by the Civil Aviation Division for airport construction, etc., totaled $2,047,115,109. The aggregate for stores placed on United Kingdom account and United Kingdom commitments for plants and plant extensions and orders for output of some of these plants, amounted to $1,218,871,220. Contracts awarded on other accounts totaled $146,854,857.

Standardize Bolts

Purchases on Canadian account to March 31 included: Aircraft, $391,719,381; alloys and metals, $7,738,570; construction and defense projects, $189,562,478; machinery, $19,194,753; ordnance, $200,496,506; tools, $6,804,424.

H. H. Foreman, administrator of fabricated steel and nonferrous metals, has issued an order simplifying and standardizing stock production of sizes of carriage, machine, tire, elevator and step bolts and lag screws. The order restricts production to specified sizes and reduces manufacture for stock purposes by about 65 per cent of the former range. Manufacturers are ordered to report on inventory as of March 31. No restriction is placed on sale and delivery from present stocks but a record of sales is to be kept and a report made to the administration.

To increase collection of scrap from remote sources minimum as well as maximum prices have been established for all parts of Canada. Previous orders regulated prices only in Ontario, Quebec and British Columbia. Heavy freight charges prevented dealers from buying material in areas distant from consumers.

Under the new plan dealers will receive a minimum of $10 for cast iron scrap in British Columbia, Saskatchewan, Alberta and Manitoba and $7 per ton on steel scrap in Saskatchewan, Alberta and Manitoba. Loading and handling charges average about $1.50 per ton, making the price to individuals $8.50 for cast iron and $5.50 for steel.

In New Brunswick, Nova Scotia and Prince Edward Island prices are controlled as in Ontario and Quebec by maximum prices which may be paid by a consumer at a basing point.

Electric Power May Be Rationed in Dominion

Some curtailment of nonwar uses of electric power may be necessary in Canada late in 1942 as a result of war industries being established there, William L. Batt, chairman, United States-Canada Materials Co-ordinating Committeee, announced last week after a conference with Canadian officials.

Such a curtailment would affect United States supplies of newsprint, as this industry is one of Canada's largest users of electric power. The time or extent of this possible curtailment, however, is uncertain.

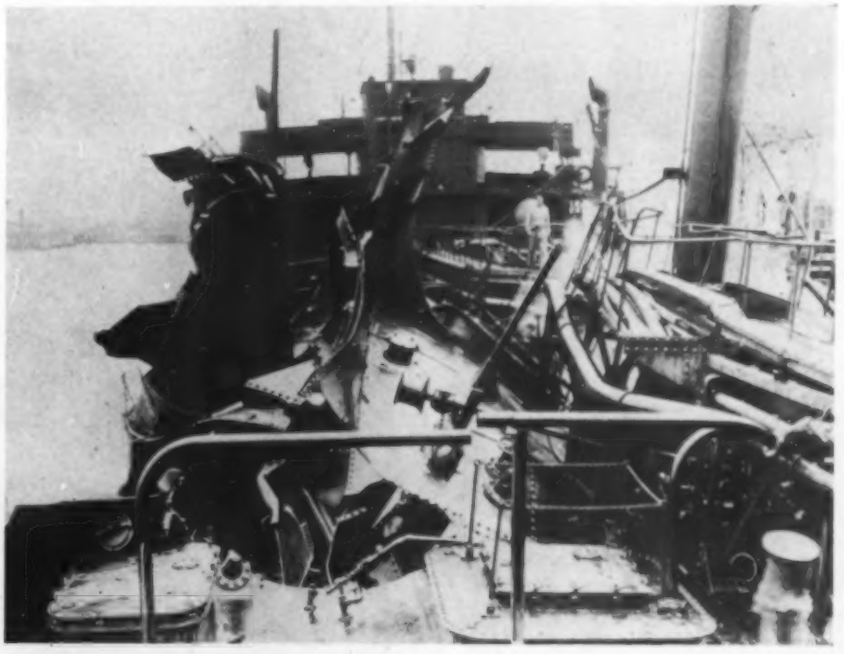
Ruling factor will be waterfall in Canada. Low water may bring drastic curtailment, and plenty of water would reduce it to a minimum.

Aluminum and chemical plants now projected for Canada, at the request of the United States, will take the bulk of the Dominion's available power.

Many Production Records Cited by U. S. Steel Corp.

"Production for Victory" edition of *U. S. Steel News*, published last week, disclosed a large number of production records attained by subsidiaries of United States Steel Corp. One subsidiary was cited as having established 157 new production records in 1941. These included new high marks by 22 of its 57 blast furnaces, by 16 of its 25 steel producing departments, by 46 out of 92 primary and finishing mills, as well as 73 all-time records in plants producing molds, wheels, axles, armor forgings and castings.

Torpedoed Tanker Saves Most of Cargo



TOP decks ripped by an Axis torpedo, this American tanker made port under her own power, under escort of a U. S. destroyer. The highly inflamable cargo did not ignite and most of the oil was saved. U. S. Navy photo from NEA

Armco Men Commended; Repair Furnace in Blast

Making repairs to a blast furnace while it is in blast is seldom attempted. Eight men of American Rolling Mill Co.'s Hamilton, O., plant cheerfully tackled the job of repairing the vortex — centrifugal dust catcher—of the No. 1 furnace there, while the giant structure was still producing pig iron, and came through without an injury or production delay. Similar repairs have been made before, but the furnace has always been shut down. Three days were spent in planning to insure safety of the men.

Word filtered through to Washington and Col. A. Robert Ginsburgh of the War department, headquarters, Service and Supply, wrote a letter to each of the men, in part: "Congratulations on keeping war production going."

Men of Armco's Middletown division, which includes the Hamilton plant, recently received the following telegram from Under Secretary of War Patterson:

"The Army has been informed that you have broken by 1000-tons previous monthly plant record of pig iron output, steel output by 3600 tons and ingot production by 6000 tons. You are doing your share in giving American soldiers the weapons they must have to take the offensive in this war. Congratulations on your fine work! Keep it up."

Manufacture of steel artillery shell casings will be started soon at one of the company's plants, Calvin Verity, executive vice president and general manager, announced.

A Detroit company will manufacture the casings, Armco making available certain buildings and equipment, and supplying the special steel blanks from which the casings are made.

A substantial number of men and some women will be employed in the new project, and arrangements have been made with the Detroit company whereby Armco employes

Awards on the Industrial Front . . . .

WHEN the Navy Ordnance Flag and the Navy "E" pennant are presented to manufacturing companies, Navy "E" lapel pins are issued to employes. Lodge & Shipley Machine Tool Co., Cincinnati, awarded the Flag and Pennant, sent to the editor a picture of the pin—"Now proudly worn by all the personnel"

VOLUNTARY participation in the war bond sales drive by 99 per cent of employes of Mackintosh-Hemphill Co., Pittsburgh, was recognized last week (above) with an award of the Treasury Department's "T", or "Minute Man" flag. Col. George H. Cherrington, assistant executive officer, second military area, is shown presenting the flag to C. V. Wilt, general works manager

Illustrated at the right is the presentation of the Navy "E" flag and pennant to Lukens Steel Co., as reported in STEEL, April 6, page 3

in the plant, whose employment has been affected by the change over from civilian to war production will be given the opportunity to qualify for work.

"Presses and other machinery will be shipped at once, and operations will be started as soon as possible," Mr. Verity said.

New Texas Blast Furnace Plant Approved by WPB

Charter of the Lone Star Steel Co., with capital stock of $1,000,000, has been filed with the Texas secretary of state in Austin. Its purpose is to construct blast furnaces near Daingerfield, Tex., at a cost of $14,850,000.

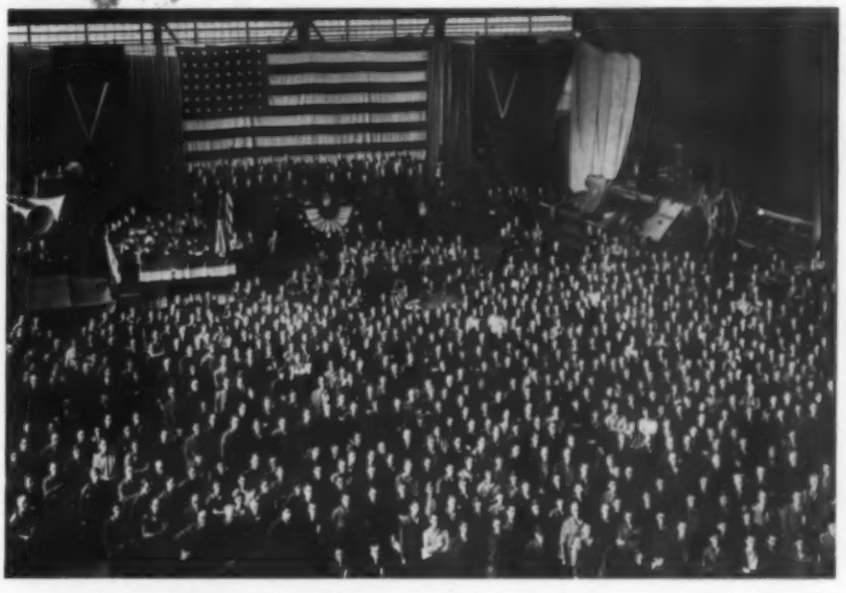
Incorporators are John W. Carpenter, Dallas, president of the Texas Power & Light Co.; Nathan Adams, Dallas, banker; Charles R. Moore, W. W. Lynch, E. B. Germany, R. L. Thornton and Fred Florence, all of Dallas; and W. O. Irwin, Daingerfield.

Iron ore for the plant will be obtained from deposits in northeast Texas which have been acquired by the company.

Project has been approved by the WPB and placed high on a building schedule that tentatively calls for completion by Aug. 1, 1943. The Defense Plant Corp. will finance the project and lease it to Lone Star.

"Application for a steel plant to dovetail into the blast furnace project is pending before the WPB," Mr. Carpenter said. "It would increase the project by $21,518,750 and give Texas a steel plant of 500,000 finished net tons capacity a year. If approved, the steel plant would feed, primarily, the shipbuilding plants of the gulf coast. . .

"Early thought on this subject was in terms of getting coke from Birmingham, but our studies of Oklahoma coals established, to the satisfaction of the WPB and its consultants, that Oklahoma coal was a coking coal satisfactory for the making of pig iron."



ALL employes and executives of Morgan Engineering Co., Alliance, O., assembled in the main erection room, right, when the Navy "E" pennant was tendered President A. F. Morris by Capt. E. A. Lofquist, chief of staff, Ninth Naval District at Great Lakes, Ill. "E" lapel badges were accepted on behalf of employes by the deans of the workmen, John B. Miller and Charles Schultz, with combined service records of more than 120 years

ALL-NAVY "E" was presented to the New Kensington Works of the Aluminum Co. of America, left, in a ceremony attended by 7000 employes. Roy A. Hunt, Alcoa president, told workers the award was earned by: Co-operation of management; co-operative attitude of plant personnel; maintenance of quality standards; and performance on delivery schedules. In presenting the award, Rear Admiral A. E. Watson, commandant, fourth naval district, emphasized the importance of aluminum in the war program

Plant Committees Push Speed and Volume Campaigns

EMPLOYES and officials of Westinghouse Lighting Division, Cleveland, held a meeting in Hotel Statler, that city, Sunday afternoon, April 12, to launch a joint labor-management campaign as an answer to Donald M. Nelson's request for co-operation.

Under the banner "Quicker for Victory," symbolized by "Q4V," the plant labor-management committee is inaugurating new methods. Among them is a new and revised system whereby employes who initiate "victory ideas" will receive higher cash payments, with merit awards for outstanding ideas. Safety work will be stepped up to prevent accidents that would thwart production.

Records are to be compiled and each week a mounted, cut-out life-size portrait of General MacArthur will be placed in the department which made the best record the previous week.

An animated dummy labeled "Slap Happy Jappy" carries various posters and slogans aimed at arousing enthusiasm and team-work. Emphasis is placed on conservation of materials and tools.

A salary deduction plan has been formulated to enable employes to make liberal purchases of war bonds. Employes will wear buttons of bronze, silver or gold, depending on their individual production records.

The campaign is to be intensified still further as new methods and new "stunts" to encourage outstanding performance, are developed.

Labor-Management Groups Tell Of Efforts To Speed War Output

Reports on the formation of labor-management shop committees to stimulate the war production are notable for the absence of labor or management recrimination, WPB reports.

Often the reports refer to local conditions and of how posters, war news, slogans, suggestion boxes and informational literature is being used to increase output.

American Car & Foundry Co.'s Buffalo plant committee reported it had adopted "Volume for Victory" as its slogan.

Erie Concrete & Steel Implement Co., Erie, Pa., announced it was building ships on the same spot where Admiral Perry built ships in 1812 and had adopted for its slogan: "Perry did it and so will we."

Otis Steel Co., Cleveland, and the Steel Workers Organizing Committee announced the formation of a joint committee to spur production and conserve critical materials.

LIFE-SIZE cut-out of General MacArthur for department with best weekly record

More War Plants On 24-Hour Schedules

Great gain in round-the-clock operation of war industry plants is evidenced by a survey by the National Industrial Conference Board. Of 151 companies covered, 37 reported they are operating plants 168 hours a week. Twenty-three others are operating 144 hours, or six days on a three-shift basis.

Many other week lengths were reported down to 40 hours, as follows:

Hours per Week	No. of Companies	Hours per Week	No. of Companies
40	15	120	9
48	6	121 to 143	10
50	2	144	23
56	2	145 to 159	3
58	1	160	2
60	1	161 to 167	2
61 to 100	9	168	37
101 to 119	6	Varies	23

Forty hours was the most frequently reported work week per employe, but 35 companies reported 48 hours; 21 companies from 50 to 59 hours; and 12 companies 60 hours or more.

U. S. Chamber Proposes Extensive Tax Revision

An overall war revenue program was laid before Congress last week by the Chamber of Commerce of the United States, Washington, through Ellsworth C. Alvord, its federal finance chairman, who also proposed that corporations be permitted to return to the 1940 system of computing normal taxes.

Recommendations included a 100 per cent excess profits tax on "true normal profits," 25 per cent normal tax on corporations, war surtax of 10 per cent and a 5 per cent withholding tax on compensations, dividends and interest paid to individuals.

Other suggestions called for higher individual income taxes, producing another $1,000,000,000, deductions limited to 20 per cent of net income of corporations and individuals for funds invested in non-negotiable government bonds, and a retail sales tax at a rate of about 10 per cent, raising $5,800,000,000 new revenue.

Street Car and Bus Passengers Increased 20%

Passengers carried on street car and bus lines in 109 cities outside New York in the first quarter of 1942 increased nearly 20 per cent over the period in 1941, American Transit Association, New York, reported last week. Charles Gordon, managing director, stated that the industry will be hard pressed for equipment to provide service.

"Based on the trends in 1941, it had been estimated previously that the industry would need a minimum of 12,000 additional motor buses, 800 street cars and 600 trolley coaches in 1942 to handle a predicted traffic increase of 20 per cent this year," he said. Deliveries have fallen far behind, due to manufacturers' difficulty in obtaining materials.

Gear Sales Increase

American Gear Manufacturers Association, Wilkinsburg, Pa., reports industrial gear sales for March 1942 were 58 per cent above March 1941 and 28.8 per cent above February 1942. The three months ending with March, 1942 are 35.5 per cent above the corresponding period of 1941. The compilation applies only to industrial gears and does not include automotive gears or those used in high-speed turbine drives.

The *BUSINESS TREND*

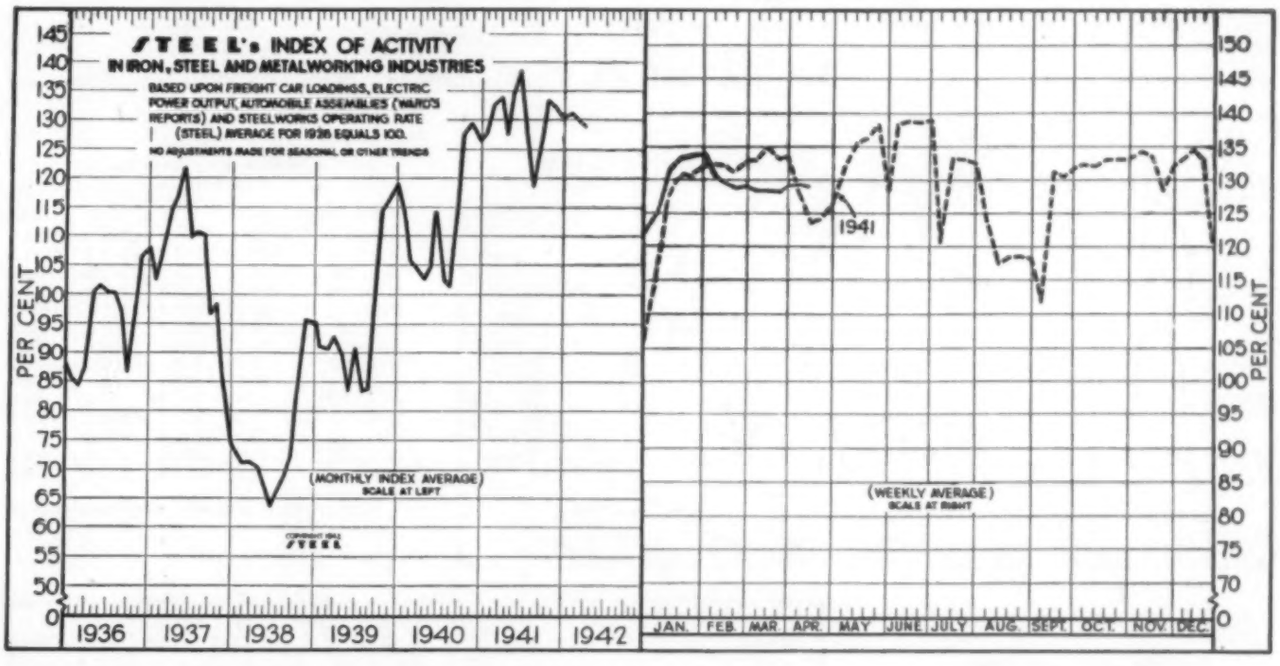
Many Small Concerns Drawn into War Effort

STEADY expansion in industrial production has been aided measurably by the increasing number of small industrial concerns which are being drawn into the sphere of the war effort. Progress in this direction has been particularly noteworthy in recent weeks.

In those instances where output has failed to reach or maintain maximum capacity, shortages of materials remain the chief obstacle. However, war or closely related industries continue to establish new production records. We have made marked progress in the production of military goods but output must rise much further to meet the current and future demands.

STEEL's index of activity in the iron, steel and metalworking industries eased to 129.2 during the period ended April 11. This represents a decline of but 0.4 point from the preceding week's figure and compares with the 123.8 level recorded in the corresponding week last year.

Ingot production established a new weekly record in the period ended April 11. Heavier movement of steel scrap to steel mills is expected to maintain or make it possible to further increase output over the coming weeks. The national steel rate stood at 98.5 in the week of April 11.

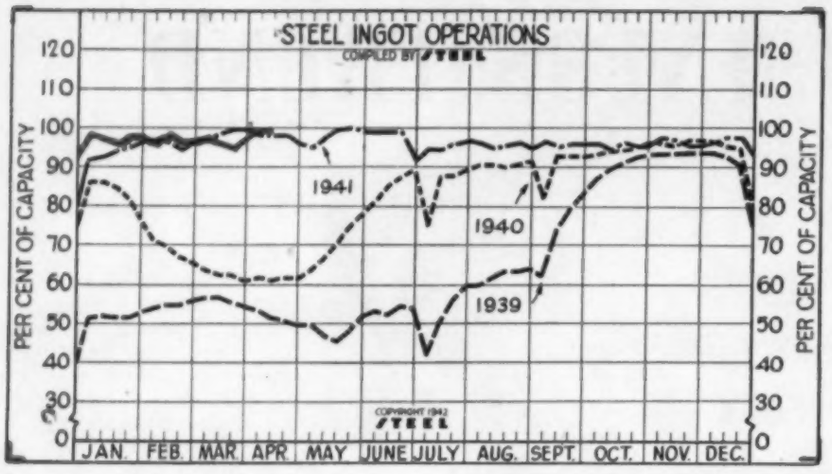


STEEL'S index of activity declined 0.4 point to 129.2 in the week ended April 11:

Week Ended	1942	1941
Jan. 31	133.9	132.0
Feb. 7	130.6	132.7
Feb. 14	129.8	132.3
Feb. 21	129.0	131.2
Feb. 28	129.1	133.0
Mar. 7	128.3	133.1
Mar. 14	128.3	135.0
Mar. 21	128.1	133.5
Mar. 28	129.1	133.9
April 4	129.6†	128.9
April 11	129.2	123.8

†Revised.

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	131.3	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Feb.	129.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	128.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	.....	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
May	.....	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	.....	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	.....	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	.....	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	.....	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.	.....	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Nov.	.....	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.	.....	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3



Steel Ingot Operations

(Per Cent)

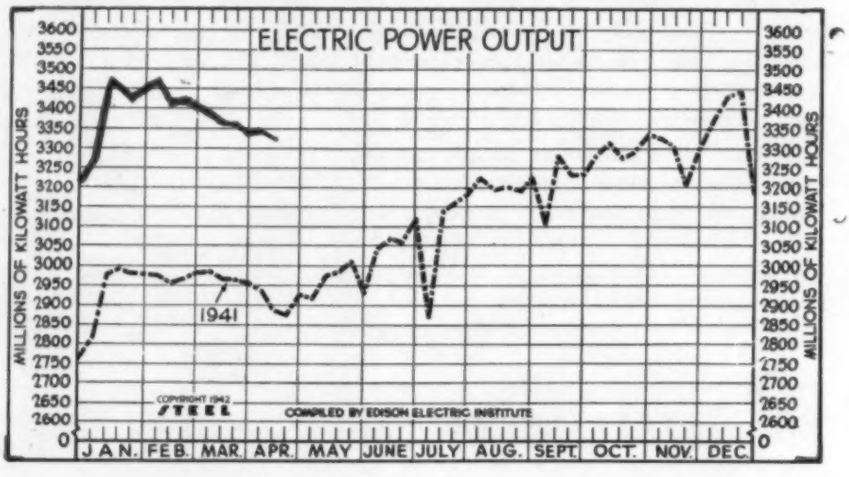
Week ended	1942	1941	1940	1939
April 11...	98.5	98.0	61.0	51.5
April 4....	98.0	98.0	61.5	53.5
Mar. 28....	97.5	99.5	61.0	54.5
Mar. 21....	95.5	99.5	62.5	55.5
Mar. 14....	95.5	98.5	62.5	56.5
Mar. 7.....	96.5	97.5	63.5	56.5
Feb. 28....	96.0	96.5	65.5	56.0
Feb. 21....	96.0†	94.5	67.0	55.0
Feb. 14....	97.0	96.5	69.0	55.0
Feb. 7....	96.0	97.0	71.0	54.0
Jan. 31....	97.0	97.0	76.5	53.0
Jan. 24....	97.0	95.5	81.5	51.5
Jan. 17....	96.0	94.5	84.5	51.5
Jan. 10....	96.5	93.0	86.0	52.0

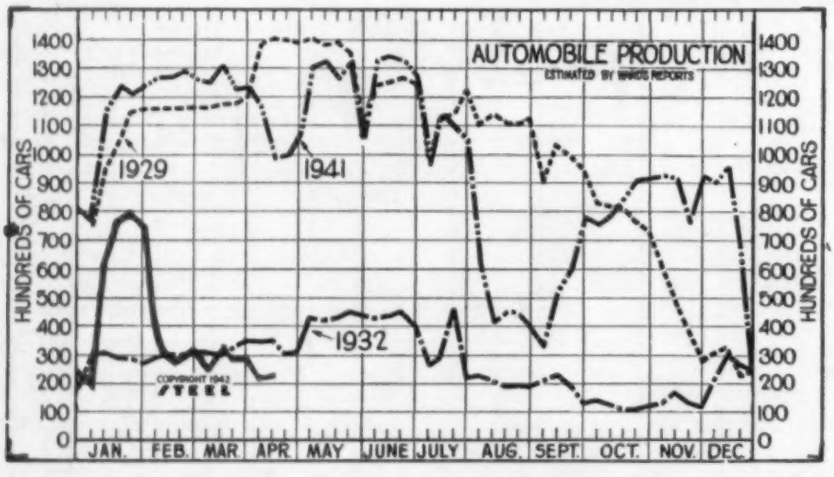
†Since Feb. 21 rate is based on new capacity figures as of Dec. 31 last.

Electric Power Output

(Million KWH)

Week ended	1942	1941	1940	1939
April 11.....	3,321	2,882	2,530	2,235
April 4	3,349	2,938	2,494	2,244
Mar. 28.....	3,346	2,956	2,524	2,272
Mar. 21.....	3,357	2,964	2,508	2,258
Mar. 14.....	3,357	2,965	2,550	2,276
Mar. 7.....	3,392	2,987	2,553	2,285
Feb. 28.....	3,410	2,982	2,568	2,294
Feb. 21.....	3,424	2,968	2,547	2,269
Feb. 14.....	3,422	2,959	2,565	2,297
Feb. 7.....	3,475	2,973	2,616	2,315
Jan. 31.....	2,468	2,978	2,633	2,327
Jan. 24.....	3,440	2,980	2,661	2,340
Jan. 17.....	3,450	2,996	2,674	2,342
Jan. 10.....	3,473	2,985	2,688	2,329
Jan. 3	3,287	2,831	2,558	2,239
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27.....	3,234	2,757	2,465	2,175


ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1941
COPYRIGHT 1942 STEEL
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.



Auto Production

(1000 Units)

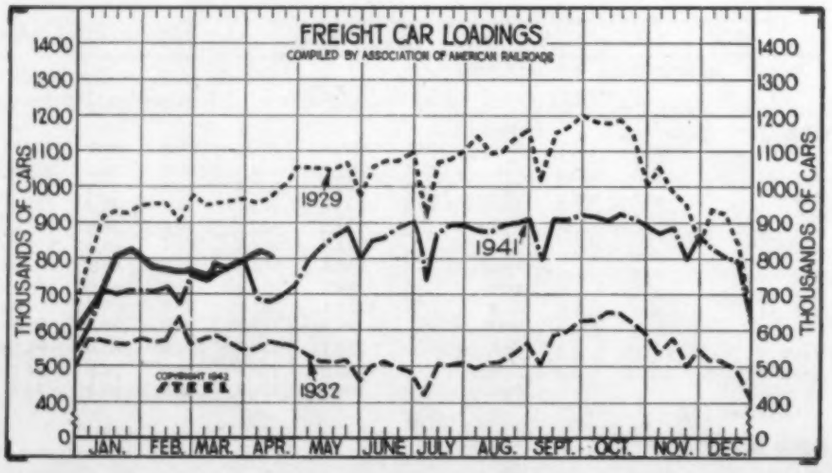
Week ended	1942	1941	1940	1939
April 11...	23.0	99.3	101.9	88.1
April 4....	22.3	116.3	101.7	87.0
Mar. 28....	28.9	124.2	103.4	86.0
Mar. 21....	28.9	123.8	103.4	89.4
Mar. 14....	30.6	131.6	105.7	86.7
Mar. 7.....	24.5	125.9	103.6	84.1
Feb. 28....	30.1	126.6	100.9	78.7
Feb. 21....	25.7†	129.2	102.7	75.7
Feb. 14....	29.8	127.5	95.1	79.9
Feb. 7....	37.1	127.7	96.0	84.5
Jan. 31....	73.3	124.4	101.2	79.4
Jan. 24....	79.9	121.9	106.4	89.2
Jan. 17....	75.0	124.0	108.5	90.2
Jan. 10....	59.0	115.9	111.3	86.9

†Canadian trucks and automobiles and United States trucks, since Feb. 21.

Freight Car Loadings

(1000 Cars)

Week ended	1942	1941	1940	1939
April 11.....	814	680	619	548
April 4.....	829	683	603	535
Mar. 28.....	805	792	628	604
Mar. 21.....	797	769	620	605
Mar. 14.....	799	759	619	595
Mar. 7.....	771	742	621	592
Feb. 28.....	781	757	634	599
Feb. 21.....	775	678	595	561
Feb. 14.....	783	721	608	580
Feb. 7.....	784	710	627	580
Jan. 31.....	816	714	657	577
Jan. 24.....	818	711	649	594
Jan. 17.....	811	703	646	590
Jan. 10.....	737	712	668	587

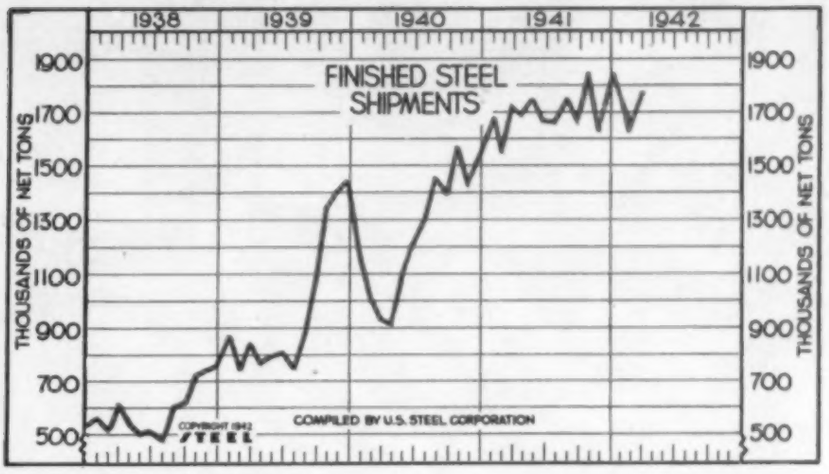


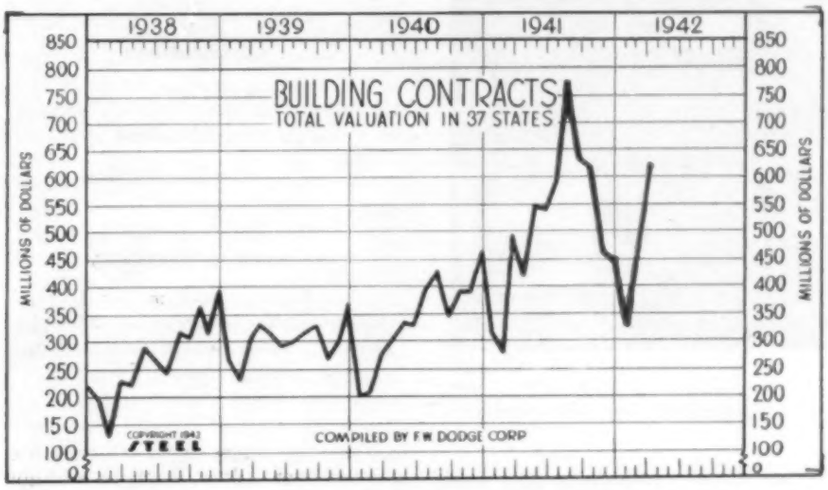
Finished Steel Shipments
U. S. Steel Corp.

(Unit 1000 Net Tons)

	1942	1941	1940	1939	1938
Jan...	1738.9	1682.5	1145.6	870.9	570.3
Feb...	1616.6	1548.5	1009.3	747.4	522.4
Mar...	1780.9	1720.4	931.9	845.1	627.0
Apr...	.....	1687.7	907.9	771.8	550.5
May..	.....	1745.3	1084.1	795.7	509.8
June .	.....	1668.6	1209.7	807.6	525.0
July..	.....	1666.7	1296.9	745.4	484.6
Aug..	.....	1753.7	1455.6	885.6	615.5
Sept..	.....	1664.2	1392.8	1086.7	635.6
Oct...	.....	1851.3	1572.4	1345.9	730.3
Nov..	.....	1624.2	1425.4	1406.2	749.3
Dec...	.....	1846.0	1544.6	1444.0	765.9
Tot.†	.....	.....	15,013.7	11707.3	7315.5

†After year-end adjustments.





Construction Total Valuation
In 37 States

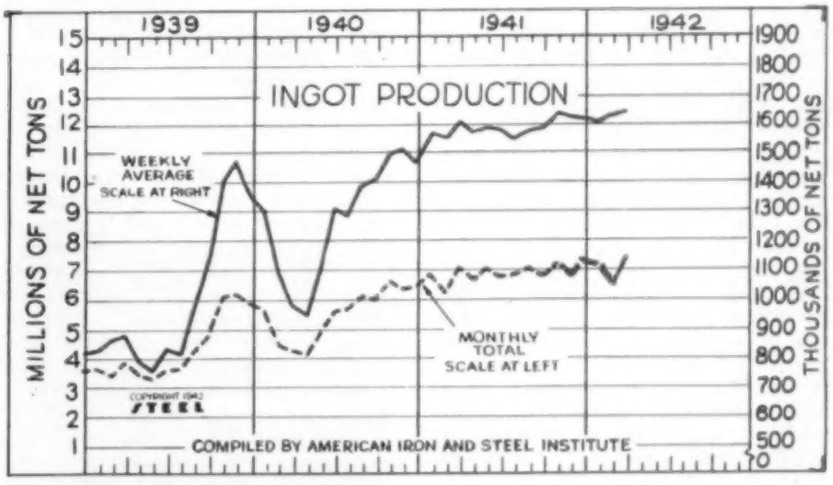
(Unit: $1,000,000)

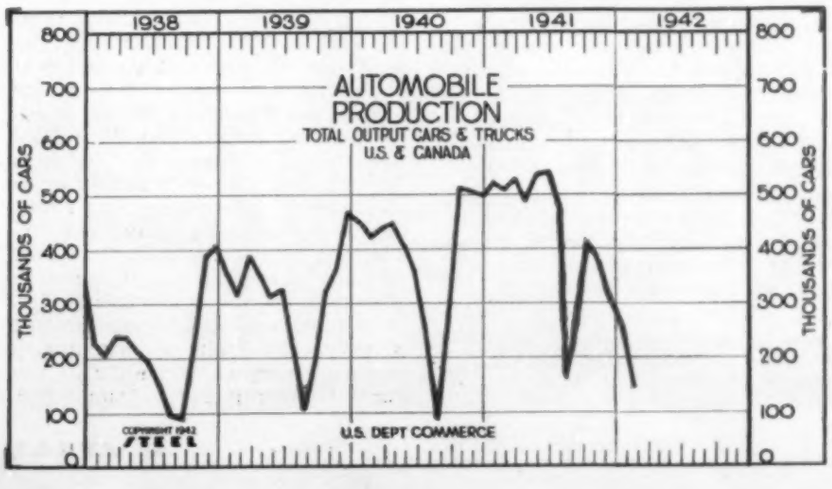
	1942	1941	1940	1939	1938
Jan...	$316.8	$305.2	$196.2	$251.7	$192.2
Feb...	433.6	270.4	200.6	220.2	118.9
Mar...	610.8	479.9	272.2	300.7	226.6
April.	.....	406.7	300.5	330.0	222.0
May..	.....	548.7	328.9	308.5	283.2
June .	.....	539.1	324.7	288.3	251.0
July..	.....	577.4	398.7	299.9	239.8
Aug..	.....	760.3	414.9	312.3	313.1
Sept..	.....	623.3	347.7	328.2	300.9
Oct...	.....	606.3	383.1	261.8	357.7
Nov..	.....	458.6	380.3	299.8	301.7
Dec...	.....	431.6	456.2	354.1	389.4
Ave...	.....	$500.6	$333.7	$295.9	$266.4

Steel Ingot Production

(Unit 100 Net Tons)

	Monthly Total		Weekly Average	
	1942	1941	1942	1941
Jan....	7,124.9	6,922.4	1,608.3	1,562.6
Feb....	6,521.1	6,230.4	1,630.3	1,557.6
March.	7,392.9	7,124.0	1,668.8	1,608.1
April..	.....	6,754.2	.....	1,574.4
May...	.....	7,044.6	.....	1,590.2
June ..	.....	6,792.8	.....	1,583.4
July...	.....	6,812.2	.....	1,541.2
Aug....	.....	6,997.5	.....	1,579.6
Sept...	.....	6,811.8	.....	1,591.5
Oct....	.....	7,236.1	.....	1,633.4
Nov....	.....	6,960.9	.....	1,622.6
Dec....	.....	7,150.3	.....	1,617.7
Total..	.....	82,836.9	.....	1,588.7





Automobile Production

(Unit: 1000 Cars)

	1942	1941	1940	1939	1938
Jan.	260.1	524.1	449.3	357.0	227.1
Feb.	154.3	509.3	421.8	317.5	202.6
March	.....	533.9	440.2	389.5	238.6
April	.....	489.8	452.4	354.3	238.1
May	.....	545.3	412.5	313.2	210.2
June	.....	546.3	362.6	324.2	189.4
July	.....	468.8	246.2	218.5	150.4
Aug.	.....	164.8	89.9	103.3	96.9
Sept.	.....	248.8	284.6	192.7	89.6
Oct.	.....	401.4	514.4	323.0	215.3
Nov.	.....	373.9	511.0	370.2	390.4
Dec.	.....	302.5	506.9	469.0	407.0
Ave.	.....	.....	391.0	311.0	221.3

How a Large Company Conserves Material By

. . . . substitutions
. . . . redesign
. . . . simplification
. . . . standardization

By DAVID R. KELLOGG

Assistant to Manager
Engineering Standards Department
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Fig. 1—A domestic substitute for Japanese paper, 0.0005-inch thick and made of old rope, is being wound around the wire as it passes through the spindles

WHILE THE East Pittsburgh, Pa., Works of Westinghouse Electric & Mfg. Co. has for some time been largely devoted to defense orders, this is not true of all of the company's outlying plants, and it is of interest to see what some of these other plants are doing to relieve the situation caused by shortages of essential materials. Table I is a partial list of scarce materials formerly used and substitutes now replacing them.

Obviously, the references to the refrigerator industry which follow are no longer in effect since refrigerator manufacture has about ceased, but the substitutions developed before the ban are still applicable to many other products of similar construction.

At the East Springfield, Mass., plant, where refrigerators and motored domestic appliances are made, the brass evaporator for the refrigerators has been changed over to vitreous enameled steel. This was the way the earliest refrigerator evaporators were made. Cracking of the enamel used to cause some difficulties, but extra strong reinforcement and somewhat heavier sheets than were formerly used are expected to prevent recurrence of this trouble.

Before the problem of scarcity of materials developed, some refrigerator parts were redesigned to make use of copper brazing. To replace the fan-cooled radiator, which was quite satisfactory in its performance in the earlier model, a couple of years ago a radiator was developed which consisted simply of a long steel tube copper brazed to a pan which fitted in the back of the refrigerator. It was cooled by convection. In addition to this, certain other parts such as the muffler and the strainer which had previously been made from brass with silver-soldered connections had been converted to steel stampings copper brazed together. Not only do these changes now save vital material, but they also save many man-hours —and man-hours are as precious as material.

High-grade fans a few years ago employed a zinc-base diecasting for the base as well as for the frame. This has been abandoned to the extent that the bases, which constitute by far the greater mass of material in the fan—aside, of course, from the actual motor itself—are now made from cast iron with appropriate treatment and organic finishes.

At the Mansfield, O., plant, where ranges, cooking devices and refrigerator cabinets are fabricated, hardware is being made of cast brass instead of aluminum diecastings. In the case of those parts which have no function other than to occupy space and give a pleasing appearance—as, for instance, escutcheon plates and hinge caps—lead-antimony alloys are being employed. Thermo plastics are used in some places instead of anodized aluminum, and while these are not too easy to get, the difficulty is not as serious as in the case of the phenolics.

The economizer well on the ranges is now vitreous enameled steel instead of aluminum. The heater tubes for the Corox heating units have been made from a special stainless steel containing silicon. When this became a critical material, studies were undertaken to provide a different material which would not come under this classification. After a great deal of searching, it was found that one of the high-chromium steels could be used, but this involved a great deal of development work at the factory to determine just the proper schedule for swaging. These difficulties have now been overcome, and it is felt that this element will give quite satisfactory service. Possible shortage of this material may force the adoption of a plain steel tube, cast in iron, or even, if worst comes to worst, an open wire ceramic heater.

On thermostats which operated at a relatively high temperature, it was necessary to make one of the current-carrying parts from some-

From a paper presented at the convention of the American Society of Mechanical Engineers, New York, Dec. 2, 1941.

thing which would not oxidize at this high temperature and would have a reasonable conductivity. Stainless was used for this, but as the supplies of this material went lower and lower, it finally became impossible to obtain even the small amount needed for this piece. Silver is now being used here with success and, strange as it may seem, with not an unduly great increase in cost.

The new fully automatic washing machine had been carefully designed around the best materials available from the standpoint of corrosion resistance and overall performance. This meant a great many aluminum base diecastings as well as some zinc-base diecastings, which, running under oil in an enclosed space, could be expected to give a long life with freedom from corrosion. While all these have been given up by redesign and the cost of manufacture is going to be rather seriously affected, the product is still expected to give satisfactory service.

Ice cube trays, which were anodized rubber with a special coating to prevent adhesion, are now rubber with wire inserted handles and stiffeners to permit putting a tray full of water into the freezing space without spilling.

At the Lighting Division in Cleveland, it has been necessary to abandon the use of the Alzac treated aluminum reflectors for civilian work, although this process is still being employed on war production jobs as it produces results which cannot be obtained in any other way. Certain of the commercial lines have been modified by dropping units from them, and others have been changed over to spun steel with vitreous enamel. Silvered glass reflectors will be used in some places and these, while they have the disadvantage of high cost and fragility, do have excellent reflecting properties.

TABLE I—Substitutes Now Being Used by Westinghouse

Material	Substitute Material	Application
Nickel steel	Molybdenum steel	Shafts, bolts, gears, etc.
Tungsten steel	Molybdenum steel with small percentage of tungsten	High-speed steel tools
Nitriding steel	Chromium steel	Circuit breaker
18-4-1 steel	High-carbon, high-chromium steel	Blanking dies
Stainless steel	High-chromium steel	Electric range heater tubes
Aluminum	Copper	Disk for watt-hour meter
	Brass	Shaft for watt-hour meter
	Enameled steel	Cover for electric roaster and cooking well for electric range
	Rubber, enameled steel sheets, or plastics	Ice cube trays
	Enameled steel	Ice cube compartment door
	Rubber, capaco brass, plastics, or enameled sheet steel	Parts and agitator of domestic laundry equipment
Aluminum diecastings	Sheet steel with water-proof finish	Sockets for outdoor watt-hour meters
Zinc die castings	Steel or brass	Handles and hinges for refrigerators
Aluminum, brass, and alloy castings	Cast iron	Luminaire parts for lighting lamps
Brass	Steel plated with copper or brass or gilding metal	Bases for incandescent lamps
Nickel	Nickel-plated steel or copper	Supports for incandescent lamps
Spun aluminum	Spun steel	Searchlight reflectors
Aluminum sheet, alzak	Iron sheet with high-reflecting porcelain enamel finish or glass with silvered finish	Reflectors
Zinc diecasting	Cast iron	Fan bases
Silk	Cotton, glass, or asbestos	Insulation fabric
Mulberry fiber	Old rope	Jap paper insulation
Tung oil	Dehydrated castor oil, soy bean oil, citicica oil	Insulation varnish
Aluminum	Plastic	Nose or windshield for anti-tank and anti-aircraft shell

Fig. 2—Sun glass replaces asbestos in insulation for copper wire. Operator is inspecting the glass strands before they are machine-woven around the wire

Some of the pole line hardware employed by this division has been changed over from a galvanized finish to rust inhibiting primer and paint, and while this is not as satisfactory as the galvanized job, it is a finish which will fail in a gradual manner and will advertise the beginning of failure so that repainting may be done before corrosion becomes serious.

At the Lamp Works in Bloomfield, N. J., experiments are being carried out to utilize a brass-plated drawn steel shell for lamp screw bases. This is already in production on certain lines and will probably be completely adopted as soon as a few more of the wrinkles have been ironed out. The nickel support wires will be replaced by nickel-plated steel in some cases, and in others where the mechanical shock is not so severe, copper will probably be used.

At the Bryant Electric plant in Bridgeport, Conn., the molding of urea resin dishes has been abandoned. Some of the thermo plastics are still being used on civilian work as well as thermo setting resins for more critical applications.

The little heater incorporated in

(*Please turn to Page* 105)

Fig. 1—Simple equipment for electrographic tests can be made up in portable form and the metal analyzed without removing it from other parts to which it may be attached. Shown here is a laboratory setup. Illustration by Bell Telephone Laboratories Inc.

Electrographic ANALYSIS

. . . . a comparatively new method of analyzing metals that does not destroy the sample; takes only a few seconds or minutes; gives positive color reactions entirely; shows uneven distribution of the element sought

By E. A. ARNOLD
Associate Professor
Chemistry Department
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THE MOST characteristic chemical reaction that one can obtain to confirm the presence of an element in a complex unknown substance is a color reaction. Therefore, many of the reactions used for the purpose of confirmation in the ordinary scheme of qualitative analysis are color reactions. The number of these characteristic color reactions has been greatly increased by the work of Professor Feigl, and the technique which he worked out to employ with many of these new reagents is now known to many chemists under the name of "spot tests."

But the usual scheme of running a qualitative analysis is relatively slow and further requires the destruction of a sample of the material to be analyzed. For example, a certain steel is to be tested qualitatively for nickel. For usual process involves dissolving a sample of the steel in acid and after necessary chemical treatment to prevent interference by the iron, adding dimethyl glyoxime, resulting in the appearance of the characteristic red precipitate if nickel is present. The whole procedure requires considerable time and also the actual chemical transformation of the material used as a sample. Further, if an uneven distribution of the iron and nickel exists, one has no knowledge of this as the qualitative test shows only the presence or absence of nickel and tells nothing about its distribution or segregation.

Electrographic methods, although known since 1929, have been recently developed to a high state of usefulness. The principal advantages gained in using this type of method are: First, the sample is not destroyed; second, the methods are rapid requiring only times measured in seconds or, at the most, minutes; third, color reactions are used entirely, thus making the identification more positive; fourth, the result shows any uneven distribution of the metal sought.

The principle of electrographic analysis is extremely simple. It is a known fact that if a metal is made an anode in an electrolytic cell, oxidation takes place on the surface and ions of the anode go into solution in the electrolyte. Further, since the ions are charged positively, they are directed in solution toward the cathode and lateral diffusion is negligible.

The application of these principles to electrographic analysis is at once evident. The metal itself is made an anode with an inert metal as a cathode. A filter paper or any other suitable unsized paper is soaked with a solution of a reagent that gives a precipitate with the metal ions to be investigated. This paper is placed under slight pressure between the anode and cathode and a voltage applied for a definitely measured time of the order of 5 or 10 seconds, rarely longer than one minute. The metallic ions passing into the solution react and form either a characteristic colored precipitate or a colorless one. This contact print is then treated with various solutions to dissolve out of the paper other ions dissolving at the same time, or, in some cases, to react with a colorless precipitate to produce a colored one. After suitable washing, the print may be dried and preserved.

A few examples of this technique may be given. To determine whether or not a sample of steel contains nickel, a piece of the steel to be tested is employed as an anode in the test. It is covered with a piece of filter paper saturated with a solution of dimethyl glyoxime and dilute acetic acid. The electrical circuit is closed for the proper length of time and small amounts of both nickel and iron are dissolved from the surface and enter the solution in the pores of the filter paper. The nickel ions react with the dimethyl glyoxime to form a very characteristic red precipitate of nickel dimethol glyoxime.

The iron which enters the solution as the divalent ion tends to form a brownish stain which somewhat masks the red precipitate characteristic of the nickel. But this interference on the part of the iron can be overcome readily by washing the print in very dilute acetic acid. The nickel precipitate is insoluble in this medium while the iron compound is soluble. After washing with water,

the nickel precipitate becomes easily distinguishable against the white background of the filter paper.

Another case where this technique is of value is in showing pinholes in metallic coatings. The inspection of chromium plated surfaces may be used as an example. The paper in this case is impregnated with a solution of dimethyl glyoxime made alkaline with a dilute barium hydroxide. When the electrographic exposure is made, the chromium leaves the anode as the oxidized chromate ion and reacts with the barium hydroxide in the paper to form a yellow insoluble barium chromate while nickel exposed by pinholes in the chromium plate enters the paper and forms red insoluble nickel dimethyl glyoxime. After washing the excess reagents out in water much as one washes a photographic positive on paper, the print appears as a yellow coating with red spots in it wherever a pinhole existed. It is easy to see how this might be an extremely useful test.

One further example will be given since it shows a modification of the technique. Zinc forms no simple insoluble colored compounds so that if a zinc or zinc coated material is to be examined, the filter paper is impregnated simply with a salt solution such as sodium acetate. Zinc passes into the paper as zinc ions and a small amount of acetic acid is formed. The compound of zinc is neither insoluble or colored, and immediately the paper is fixed by immersing it in a dilute sodium sulphide solution. The zinc then reacts with the sodium sulphide to form insoluble but white zinc sulphide. The zinc compound on the paper is now insoluble but still not visible against the background of white paper. It is next rinsed thoroughly in dilute acetic acid solution which removes the excess sodium sulphide. The paper is then treated with a dilute cadmium chloride solution, and the white zinc sulphide is replaced by yellow insoluble cadmium sulphide which is visible.

One or another of these types of electrographic tests or similar ones can thus be employed for an extremely wide range of analysis work. It is only necessary to know the color of the various compounds formed and to manipulate the material deposited by electrolytic action till the compound is obtained. Thus the method has possibilities of wide usage in qualitative analysis work.

The apparatus for making electrographic prints is fairly simple. The sample is contained in the press shown in Fig. 1. Between the bottom plate, made of inert or relatively inert metal such as platinum or aluminum, and the specimen is inserted the unsized paper impregnated with a solution of the proper reagent or reagents. The specimen is held in place by clamping by means of the hand wheel. The specimen itself is connected to the positive pole of a 6-volt storage battery while the bottom plate is connected to the negative pole. In the electrical circuit, there are the necessary toggle switches and rheostats so that the voltage may be controlled and varied at will. The lower two meters are a voltmeter and a milliammeter. The upper meter to the left is an automatic time switch so that the time during which current flows can be controlled accurately.

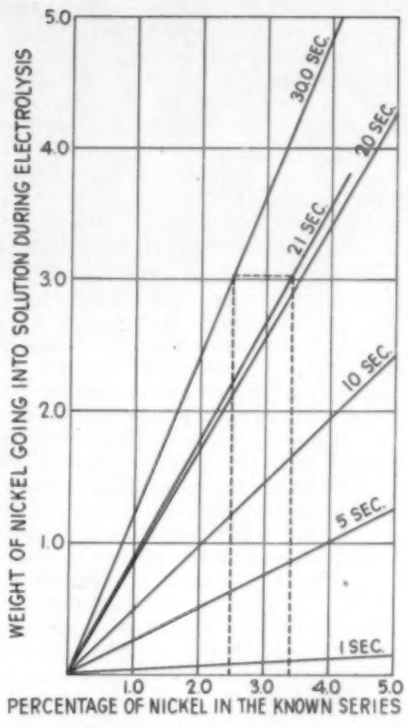


Fig. 2—Graph showing amount of nickel going into solution according to the amount of nickel in the material being tested and for various electrolysis times. These curves can be interpolated for other electrolysis times

When the circuit is closed, the metal from the anodic specimen dissolves and passes into the paper at a rate controlled by the strength of the current and in a quantity controlled by the time during which the current flows. The washing, fixing, and developing reactions can then be carried out in separate small porcelain dishes. Reagents used to impregnate the paper in which the reaction takes place may be drawn in many cases from those suggested by Professor Feigl in his book "Qualitative Analysis by Spot Tests." In the event that the reagent is an organic one or dissolved in an organic solvent, it must be remembered to add a salt to make the solution an electrical conductor.

So far, all of the suggested uses have been qualitative in nature, but Glazunow and Krivohlavy have suggested a procedure for making the method quantitative. The method proposed by these two men involves the electrographic determination of nickel in steel. These authors go into the theory of the passage of metallic ions into solution under the action of an impressed voltage and derive an equation to express this mass of metal in terms of the current, the time during which the current flows, the cross-sectional area of the test specimen, the percentages of nickel and iron in the test specimen, and their respective electrochemical equivalents. Using this equation on a series of known nickel steels, a series of curves is plotted in which the weight of nickel passing into solution is plotted against the percentage of nickel in the known specimen for various time intervals. The form of this set of curves is shown in Fig. 2.

The number written on each of the curves denotes the time interval in seconds during which the current flowed. It can be seen that these are all straight lines. This is to be expected as it stands to reason that as the percentage of nickel in the series of known standards increases, the amount of nickel passing into solution will be directly proportional to the time and also to the percentage of nickel in the test specimen. Therefore, if a filter paper saturated with a solution of dimethyl glyoxime and a little dilute acetic acid is placed between the known sample and the inert electrode, the nickel that enters the solution reacts to form a characteristic red precipitate of nickel dimethyl glyoxime and any iron entering the filter paper at the same time may be washed out with dilute acetic acid before washing with water.

Obviously the intensity of the red stain will be proportional to the time interval during which current flows and to the percentage of nickel in the known steel. It is only necessary to run a set of three or four spot tests on the unknown steel at various time intervals measured in seconds until a spot is produced for the unknown which exactly matches in color intensity one of the spots in the standard series for which both time interval and percentage of nickel are known. When the color intensity of two spots given equal time match, it is evident that the quantity of nickel is the same in both. If there were an exactly constant difference between the curves, the nickel content of the two steels would then be inversely proportional to the time intervals. This is perhaps not quite true so it is more advisable to use a graphic method of solution.

Let us assume that for a certain unknown steel a spot was obtained

in 21 seconds of the same intensity as a spot requiring 30 seconds for a known steel containing 2.5 per cent nickel. A perpendicular is drawn on the percentage axis at 2.5 per cent nickel. From the intersection of this line with the 0-30 curve, a horizontal is drawn until it intersects an interpolated or actually plotted 21 second line for the series of known steels. From this intersection a perpendicular is erected on the percentage axis. The intersection of this perpendicular on the axis corresponds to a nickel content of 3.4 per cent. If the inverse proportionality were assumed, the nickel content indicated would have been 3.56 per cent. The steel for which this spot was made actually contained 3.43 per cent nickel by the usual analytical methods—an extremely close check. These construction lines are shown in Fig. 2 as dotted lines.

The quantitative application of this method may be extended to a variety of determinations. The only conditions necessary are, first, that a satisfactory reagent or set of reagents be found to give a specific color reaction in the filter paper; and second the metallic alloy on which the determination is to be made be homogeneous at least in the range of compositions considered. This last condition is very important as it is evident that if one is dealing with a heterogeneous alloy such as, for instance, an alloy containing a eutectic mixture, the rates of solution under the action of the electric current will no longer be uniform over the exposed cross section. For this reason, then, only alloys can be used which are composed of one homogeneous phase.

Yagoda has gone one step further and made a suggestion which seems to give promise of being very useful. He suggests that the reagent producing the colored precipitate or yielding a colored precipitate on development be incorporated in a gelatine film or other peptizing agent on paper much the same as the silver salt is incorporated in the ordinary photographic printing paper. The gelatin or other suitable peptizing agent causes the precipitate to form and persist in a state of subdivision in the colloidal range. This enables one to examine a print of a surface under magnification for the purpose of observing structural heterogeneity. In using the ordinary print or filter paper already described, this is impossible due to the fibrous nature of the paper itself. Using this suggestion, Yagoda has obtained photographs showing the distribution of chlorides in various plant sections. *Modifications of this technique might be used to study structural variations in heterogeneous alloys.*

A brief survey of the readily accessible articles in the technical literature having a bearing on this subject may be of value. *Qualitative Analysis by Spot Tests* by Fritz Feigl appears in an English translation from one of the German editions and is of value in suggesting reagents that may be used for a variety of ions.

Glazunow first reported on the technique of the electrographic method before the Eighth International Congress of Applied Chemistry in Paris in 1929 and is reported on page 2 of a special supplement of *Chemie et Industrie* volume 21. This article is in French.

Glazunow and Krivohlavy report in volume 161, page 373, of the *Zeitschrift fur Physicalishe Chemie, Part A,* on the procedure for the quantitative determination of nickel in nickel steels. This article is printed in German.

Clarke and Hermance report in volume 9, page 292, of the analytical edition of the *Journal of Industrial and Engineering Chemistry* on the applicability of spot tests in general.

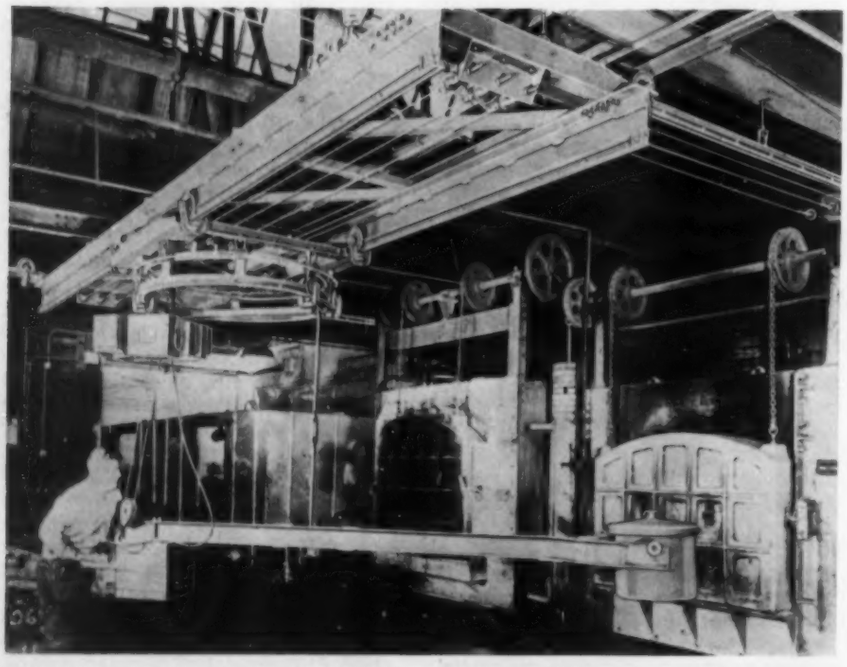
Hermance describes the principles involved in these methods in an article in the issue of the Bell Laboratories Record, volume 18, page 269, and gives a number of beautiful color photographs illustrating applications for the telephone industry.

Jirkovsky published a summarizing article in *Mikrochemie,* volume 15, page 331. This article, in German, lists the progress made in this field to the date it was written.

Yagoda's suggestion appears in volume 12, page 698 of the analytical edition of the *Journal of Industrial and Engineering Chemistry.*

A summarizing article bringing the subject to date appeared in the analytical edition of the *Journal of Industrial and Engineering Chemistry in October,* 1941. This article is a section of a more complete article on Instrumental Methods of Chemical Analysis by Muller.

Quenching Crane Moves in Every Plane



MOVING OF ANNEALING pots from furnace to quench in quickest possible time is the job of this quenching crane made by American Monorail Co., 13107 Athens avenue, Cleveland. Moving easily in every plane, it can serve a compact area containing four or more furnaces set by pairs at right angles facing the quenching machine. One man operates the crane by hand with a ½-ton electric hoist to raise or lower a 900-pound counterweight which handles the 400-pound pots. Seven-foot arm for reaching into furnace is mounted by porter bar on swivelling truck. This allows rapid swinging of load

Practice on Roofing Ternes Now in Print

Printed copies of simplified practice recommendation R30-42, "Roofing Ternes", now are available according to the Division of Simplified Practice, National Bureau of Standards, Washington. These embody the current revision which eliminates four weights of coating 15, 25, 30 and 32 pounds per double base box—leaving the 8, 20, and 40-pound coatings as the simplified list.

Copies of the practice may be obtained from the Government Printing Office, for 5 cents each.

How to Conserve Stainless Steel and Increase War Production!

When you were turning out war equipment and parts in smaller numbers, Stainless Steel scrap losses in fabrication involved fewer pounds of vital metals. But now that output has leaped into mass production, scrap losses must be reduced to an absolute minimum.

With nickel and chromium so precious to our war needs, it is vitally important that you *check your fabricating methods at every point.* Waste is terrifically expensive in loss of time and strategic materials.

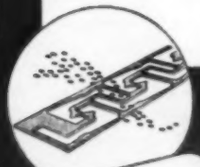
Helping to get the most out of every pound of Stainless Steel is a part of Carpenter's Wartime job. The knowledge and experience we have gained from pioneering the fabrication and use of Stainless Steels is now being offered to you. Let your Carpenter representative help you check your tools, dies and lubricants—to make sure your set-up is right for maximum production from a minimum of material. Meanwhile, here are specific suggestions to help you speed war production and conserve material. Be sure to check these points in *your* plant now! Time is short.

√Check your Scrap Losses

If you are blanking, forming or drawing parts from sheet, find out if using a narrow strip could *eliminate slitting* and reduce your scrap loss. One plant reported a 40% material saving by adopting strip to the specified width for the particular part. Jobs were laid out more economically, and time spent handling material was reduced. The accurate gauges and tolerances of Stainless Strip save wear on dies and reduce rejects.

√Check your Rejects

If your rejects are high, it's time to start checking all along the line. Material too much *undersize* can cause wrinkling in the die. *Oversize* material may explain galling and tearing. Check your tool layouts, die clearances and lubricants. And if your scrap pile *continues* to show a high percentage of rejected parts—it's time to call in an expert.



√Check your Physicals

Find out if you can take advantage of the natural strength of Stainless by using a lighter gauge strip. Often, an embossed rib can be used to add strength, allowing the use of lighter gauge stocks. Still another way to speed war production is to make sure that each order to your supplier is *complete*—from physical specifications to priority information.

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The Carpenter Stainless Selector Slide Chart can give you quick answers to your questions on the grades of Stainless to meet your requirements. It shows the machining, heat and corrosion resisting properties of each analysis of Stainless Steel. A note on your business letterhead will bring you a Slide Chart—free to Stainless Steel users in the U. S. A.

Carpenter STAINLESS STEELS

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HOW TO AVOID CRACKS IN WELDS

. . . approached from a study of forces encountered

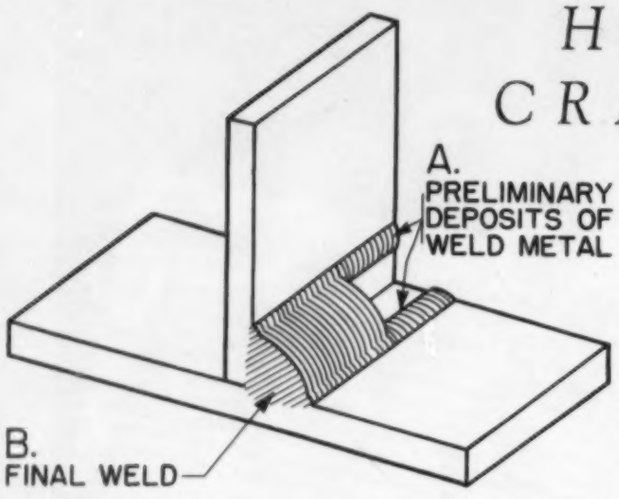

Fig. 1. (Above) — To avoid interior cracking, "double welding" first deposits weld metal on both plates as shown at A. Main weld B is then made between the original deposits. This avoids an abrupt change in section

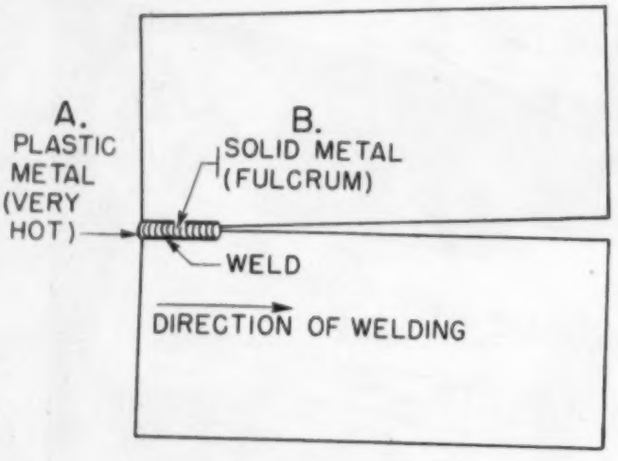

Fig. 2. (Below)—Since point A has less metal surrounding it to carry off the heat of welding than does point B, it solidifies more slowly, even though it is welded first. While A is still molten, B has solidified and acts as a fulcrum about which the remainder of the plate draws together as the weld progresses. This, added to natural shrinkage of the cooling metal, tends to pull A apart

FIRST, LET'S look at the cause of cracks. Obviously cracking results from the liberation of tensile stresses; otherwise there would be no cracking. Likewise, no cracking would occur if these stresses were absent or so slight as not to exceed the strength of the metal at any time during welding. Steel is first heated to the fusion temperature in welding. Then while the cooling and solidifying metal is at a white heat, it is devoid of ductility because although the individual grains have solidified, they do not cohere to each other. Any slight force will pull the grains apart, air will enter at the grain boundaries and what is termed a "heat crack" will occur.

A study of the forces encounted in welding provides a basis for crack elimination. First of all, forces are developed through the expansion on heating and contraction on cooling. Secondly, residual stresses in the metal parts themselves may be liberated by the welding flame. Thirdly, stresses may be introduced in the welding operation. The majority of "heat cracks" fall into the first group; that is, those developed by expansion on heating and contraction on cooling. Typical of this type of crack is the "edge crack," which starts at an external edge of a part and follows the weld into the part.

It is a matter of common experience that when two pieces of sheet metal are butted together or when one is lapped over the other, they will come together in the first instance, or move together scissors-like in the second instance, when welded along the seam of the two edges. A crack is likely to start at the edge where the weld is begun. The following analysis of the forces at work is offered in explanation of a crack of this type.

After the weld has progressed slightly from the starting point at the edge, two forces begin to operate, both tending to stretch the metal at the point where the weld was begun. One of these forces is produced by the contraction of the solidifying metal. This of itself would tend to produce a crack. In addition, the weld metal just inside the starting point solidifies faster than the edge or starting point because of the more rapid conduction of heat away from it by the adjacent metal.

The air surrounding the free edge or starting point is a relatively slow cooling medium; consequently, while the initial point is still at a white heat the next interior stage has cooled to a yellow heat. In other words, the edge is lagging behind and is still in the tender or brittle condition when the adjacent stage along the weld is in the tough and ductile conditions. This intermediate point acts as a fulcrum, so that the scissors-like action, which brings the edges of the seam together, tends to stretch the white-hot brittle starting point of the weld. Moreover, as already stated, the shrinkage is also stretching the same point, and if the combined effect is great enough, a crack occurs. The manner in which these forces act to produce cracking is shown in the sketch Fig. 2.

The considerable amount of contraction which occurs when metal freezes and cools is not generally appreciated. Not considering the contraction of the cooling but still molten metal, and starting instead at the moment of solidification, the metal shrinks about 5 per cent in volume in merely changing to the solid state. An additional contraction of almost 1 per cent then occurs before the temperature has fallen to a yellow heat. Still another contraction of 1 per cent takes place when the metal cools from a yellow heat to ordinary temperature. This sudden and considerable contraction is only one of the stretching or cracking forces that must be controlled intelligently in welding. If the solidifying metal could stretch, it would not crack; or, if the adjacent parts could yield, the contraction could be compensated.

Usually cracks are located in the base metal right at the edge of the weld. There are several reasons for this. The principal reason for this particular location is that the section is thinner than the weld and its shape changes more or less abruptly at this point. In the second place,

From a paper by A. K. Seemann, engineer, The Linde Air Products Co., New York, presented at annual meeting of the American Welding Society, Philadelphia, October, 1941.

ZINC IN WAR

"KEEP 'em Healthy"

It is rather ironic that zinc is used in the brass for shells that wound men—and in pharmaceuticals that heal them. Such is the futility of wars, yet such is the widespread importance of zinc when wars are thrust upon us. The use of zinc oxide in the preparation of adhesive tape, ointments and other medicinal products is one which carries an unquestioned preference rating. Pharmaceutical (U.S.P.) zinc oxide is the purest type of zinc oxide known and it is characterized by several outstanding qualities. It is protective, mildly astringent and adhesive. The exceptional fineness and whiteness of this zinc oxide makes it especially suitable in ointments, dusting powders and adhesive tape.

While most of the war uses, shown in the index of this book, involve larger tonnages of zinc than U.S.P. zinc oxide, few are more important from a utility standpoint. The needs of the Medical Departments of our armed forces are just another reason why civilian users of zinc may not be able to obtain all of the metal or pigment they would like to use.

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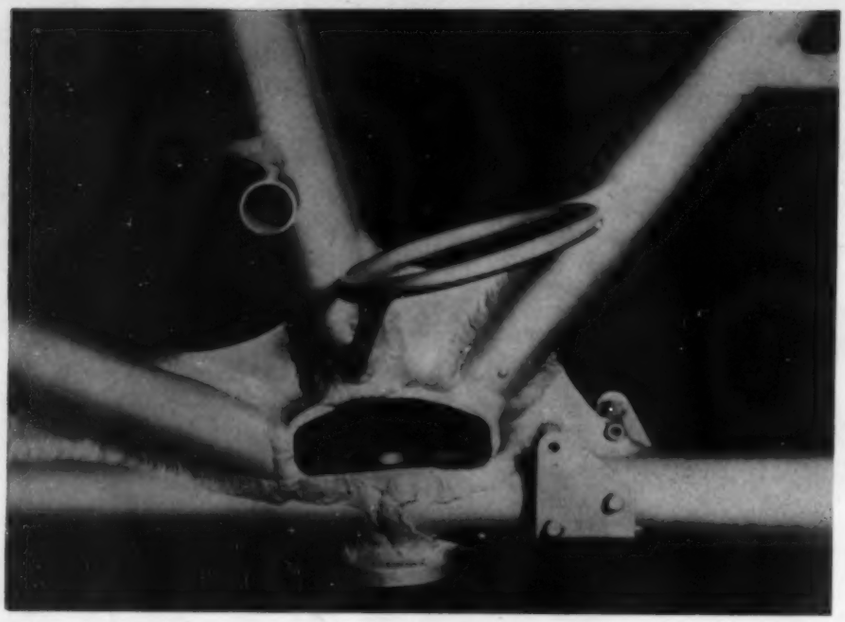

Fig. 3—This welded joint of converging tubes joined to a special control fitting is strong, yet it adds a minimum amount of weight to the structure

the base metal, because of its nature, is usually more tender at a white heat than the weld metal. Third, the thin section at the starting point on the edge remains hotter a trifle longer than the thicker, reinforced section of the weld just inside the edge. This is especially true of the lap seam where the double thickness of base metal causes a more rapid cooling rate.

An obvious remedy for the edge-type of crack has been recognized and adopted by some plants: namely, to begin the weld at some point on the seam and weld toward an outside edge rather than to start at an outside edge and weld inward along a seam. A slight compensating compression is thus brought to bear on the weld.

Sometimes the forces operating on a weld compensate or neutralize one another, and since the net result is zero, the metal is not stretched or cracked. In other words, although contraction always takes place, there may yet be forces of compression exerted in the surrounding areas which squeeze the contracting area. On the other hand, external conditions or a combination of circumstances may be such as to exaggerate the cracking tendency. The adjacent parts may be so rigid, either from their massiveness or because of being held immovable, that pure contraction occurs, resulting in a crack.

Conditions conducive to another type of cracking, known as interior cracking, can be overcome by a "double-welding" technique, which is particularly useful in joining thick material to thin material, such as a forging to a tube. Welding with this technique is performed in two steps. A deposit of weld metal is first made on both materials to be welded, as shown in Fig. 1 at A, following the outer limits of the proposed weld. The weld then is made, as shown in Fig. 1 at B, care being taken to terminate the weld within the original deposits of weld metal. In this manner an abrupt change of section is avoided, cooling takes place less rapidly, and residual stresses in the base metal are removed prior to the welding operation.

A weld is a casting, so good casting practice is also good welding practice. In a foundry, for instance, the melting and casting procedures affect the tendency to produce heat cracks, and pouring is performed as near the solidifying temperature as practicable. The welding operator, then, should employ similar principles. The welding flame, through proper adjustment, should be slightly reducing or neutral, but in no event oxidizing. The rod should contain beneficial ingredients which will further assist in avoiding oxidation. *For this reason a rod of the same composition as the base metal is seldom satisfactory.* Likewise, the metal should not be overheated.

Mention has already been made of the tensile stresses created by contraction of metal on cooling. It may be convenient to compensate these forces mechanically or thermally. Jigs may be so designed that a slight compressive force is exerted during the welding operation, but obviously this force should not be of sufficient magnitude to cause upsetting. If the parts to be welded are so positioned that end-wise movement is prevented, the local application of heat to the metal adjoining the weld area produces compressive forces sufficient to compensate for the contraction and thus avoids tensile stress on the part during cooling. This can be accomplished by local heating with the blowpipe, or, as practiced in a few plants, by enveloping the weld in an oxy-hydrogen flame. This expedient has the added advantage of insurance against oxidation, but has the obvious disadvantage of increased welding costs. Entirely satisfactory results are obtainable by local preheating with a properly adjusted oxy-acetylene flame.

Local preheating also serves to eliminate another cause of cracking. Tubing and sheet metal are not always stress-free prior to welding. This condition is brought about by such cold-working operations as straightening, bending, forming, and rolling. Residual stresses resulting from these operations are not usually uniformly distributed, and in localized areas may be sufficiently great to cause cracking if they are released during welding. Preheating these areas locally to a dull red will relieve the major residual stresses, and can be performed as a part of the welding operation.

There is a third cause of cracking which is relatively unimportant but which should be considered during examination of any cracked parts. If at the conclusion of the welding operation the part is stressed while hot, cracking may occur. Such practices as dropping parts out of jigs, careless or rough handling, and use of improperly designed jigs may cause enough stress to cause cracking.

In review, then, there are three kinds of cracks: (1) those which originate from the heat of welding, (2) those which result from stresses which reside in the metal and are released by welding and, (3) those which are introduced after welding. Understanding of the principles underlying each cause will enable the designer or operator to prevent their occurrence.

GE To Distribute Film Series on Welding

To speed up war production training, the Visual Instruction section of General Electric Co., Schenectady, N. Y., has taken over Raphael G. Wolff's color film series, "Inside of Arc Welding", for noncommercial distribution to schools and other instruction groups.

The first picture in the series, "Fundamentals", was recently completed at the Wolff studios in Hollywood. Five additional subjects are now in script, with the whole series scheduled to be completed by June.

Subjects to be covered by the films are flat arc welding, horizontal arc welding, flat and horizontal alternating-current welding, vertical arc welding and overhead arc welding.

Your shoes and *Ours*

You must have steel to do your part for Victory.

To take care of your needs, our plants are running day and night at capacity. Our men and women are AT WORK. We are busy producing our share of steel that America must have.

Is there enough steel for Victory? We say--Yes. We believe the nation's present difficulties with this critical material will be solved by cooperation between all users and producers, as partners for Victory.

When we at Youngstown look at your needs for steel, we try to put ourselves into your shoes; when you view the producer's problems, won't you try our shoes?

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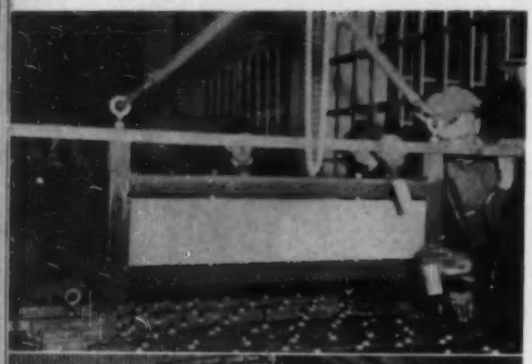
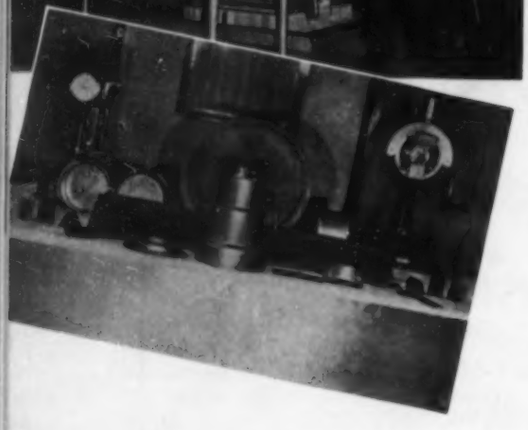
25-32E





Top to bottom, Fig. 1—A coated sheet being withdrawn from electrolyte solution. Fig. 2—Electric furnace in which the charge is fused into platines. Fig. 3—Test specimens of clad material. Fig. 4. (Below)—Forging press used to convert ingots into slabs

Manufacture of

ALLOY-CLAD SHEETS

Conservation of strategic nonferrous metals is afforded by a process new in this country of copper and copper-alloy cladding steel sheets. Ductility is superior to that of base metal. Preparations being made to clad with brass, gilding metal and stainless steel

FOLLOWING the recently completed installation of special production facilities, Follansbee Steel Corp., Pittsburgh, is now manufacturing copper and cupro-nickel clad steel by a process new in the United States, but in extensive use in several European countries.

Under the practice of Follansbee, W. Va., a forged and rolled steel slab, Fig. 4, first is coated electrolytically, as shown in Fig. 1, after which the cladding sheet is applied. The slab then is charged into a special electric furnace chamber of the bell type, shown in Fig. 2, using an atmospheric gas which is inert to the material to be treated. The charge then is subjected simultaneously to high pressure and the application of accurately controlled and scheduled electric heat. Thus the whole charge is homogeneously fused into units, commonly known as platines, of a steel base and cladding surfaces, each of which is separated by thin layers of dissimilar material. From these platines are produced the finished sheets by hot rolling, cold rolling and finishing.

The clad sheet is even and smooth, with the clad surface ranging from 5 to 20 per cent, thus increasing the availability of strategic nonferrous metals, by as much as 80 to 95 per cent. The thickness of the cladding is governed by the service requirements of the fabricator. From exhaustive tests made of the clad material, it possesses a ductility superior to that of the base material, withstanding any stress up to the breaking point of the base to which it is clad. Test specimens of the material are shown in Fig. 3. The cladding may be applied to one or both sides of the sheets, again depending upon the service required.

Follansbee is currently producing sheets in 36 x 96 inch maximum sizes, and in gages ranging from 7 to 28, inclusive. A variety of obvious applications include bullet jackets, electrical housings, utensils and containers.

In addition to cladding with copper or copper alloys, the Follansbee production will include cladding with brass, gilding metal, and stainless steel.

". . and KEEP YOUR POWDER DRY!"

IT was in 1642 that Oliver Cromwell admonished his never defeated British army, the Ironsides; "Put your trust in God, and keep your powder dry." That order applies equally today as when soldiers carried powder horns.

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Powder, today, means shells, grenades, and bombs—and also planes, tanks, food, clothing, radios, range finders, surgical equipment, medicines and chemicals, electrical supplies; in fact, all the complicated equipment of modern warfare.

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FIBREEN is doing its part in providing safe packing and protection for goods of war. It's tough and strong. It's waterproof. Used as a liner or wrapping, it furnishes vital protection, guarding against damage by rain, dirt, sea water, salt air, and long exposure to all kinds of weather from extreme heat to freezing cold.

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WELDING

Domestic Oil Furnaces

By J. E. WAUGH
Manufacturing General Department
General Electric Co.
Schenectady, N. Y.

BOTH DESIGN and fabrication of steel domestic oil-fired furnaces at General Electric's Bloomfield, N. J., plant are approached with a view to making most efficient use of welding processes. Arc and resistance welding are used. The choice for a particular piece of work depends on several important factors: Quality and speed of the process; volume of production; initial cost, maintenance and depreciation of equipment; and labor costs.

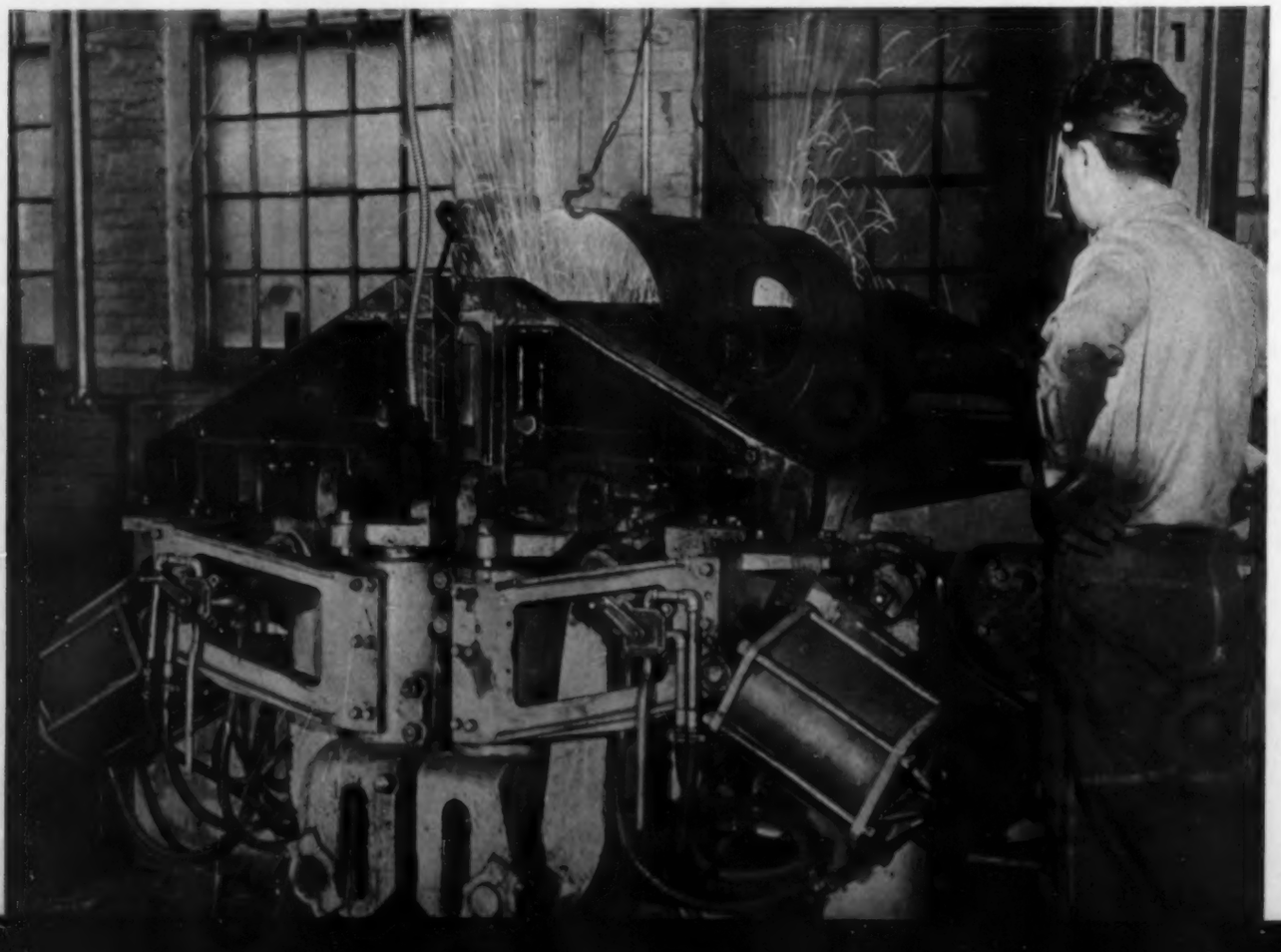
The construction of steam and hot water boilers is controlled by the ASME low-pressure heating boiler code, which specifies minimum thickness of shell plates, heads and tubes.

All shell plates must be a minimum of ¼-inch in thickness, while all heads must be a minimum of 5/16-inch in thickness, and tubes must have a wall thickness of at least $\frac{3}{16}$-inch. These thicknesses are governed primarily by corrosion and are not necessary for strength requirements. With adequate production, it becomes economical to resistance flash weld the longitudinal seams of the cylindrical shells. The attachment of heads to these shells by means of flash welding would require flanged heads to form a butt joint, and very accurate alignment of the ¼-inch shell to the 5/16-inch head. In this case it appeared more economical and practical to use arc welding because of the greater flexibility of the process where accurate alignment is difficult to obtain. Arc welding is also used for joining the integral parts and for attaching the fittings to the outer surface.

The steam and hot water boilers are designed to consist essentially of a vertical cylindrical combustion chamber surrounded by water on all sides and top, having a dry bottom and an outer shell to confine the water around the combustion chamber. In some cases an inner "bustle ring" or water chamber is included for additional capacity. Seven different combinations of units and sizes provide a similar number of different ratings.

The cylindrical shells composing the combustion chambers and outer shells vary from 18.5 inches in diameter by 30 inches long to an ellipse having a minor axis of 27 inches and a major axis of 30 inches by 49.5 inches long. These shells are all ¼-inch thick and, with the exception of the longest sizes, are flash welded in a standard mechanically operated 1000-kilovolt-ampere flash welder of the type commonly used in barrel manufacture. The flashing

Fig. 1—Flash welding of outer shell of boiler. When pressure is released, the clamping jaws at the front of the machine are swung into a horizontal position to permit removal of the shell



1902–1942

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"PITTSBURGH" toasts its employees, with whom relations have ever been in tune — no discordant note, no interrupted work in forty years. "PITTSBURGH" toasts its peace-time customers and suppliers, the relationship down through the years now cemented in a matrix strong enough to stand the strain of war's temporary dislocations. Above all, "PITTSBURGH" salutes our country and toasts the coming victory, a victory the surer, sooner, sweeter, if it comes with unity, total concentration, and the conquering power of integrity.

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PITTSBURGH TOOL STEEL WIRE CO.

MONACA, PENNSYLVANIA

DRILL RODS AND COLD FINISHED FINE STEELS FOR ARMS AND MUNITIONS, PLANES AND TANKS, TOOLS AND GAUGES, MOTORS AND INSTRUMENTS, AND A THOUSAND AND ONE SPECIAL PURPOSES IN SUPPORT OF ELECTRIFIED AND MECHANIZED WARFARE GEARING

and upset time vary from 15 seconds for the smaller to 25 seconds for the larger cylinders. A total of approximately ¾-inch of material is consumed in the flash and upset. The upset pressure is calculated to be of the order of 100,000 pounds. Due to the distribution of the cross section of the joint, it is necessary to carry the welding current slightly into the upset period. The flash is removed from the shells by means of manual chipping.

From this point the boilers are completely arc welded as a straight-line production job. A floor-type roller conveyor extends the entire length of the line with welding booths, each 10 feet square, along the line. The various assembly, welding, and testing operations are performed in these booths, each booth being equipped with an alternating-current welding transformer.

Wherever possible on welding operations the work is placed on positioning equipment to obtain the advantages of better appearance and better quality at higher welding speeds through the use of larger diameter electrodes and higher currents. For these operations, an electrode of the General Electric W24 type of "flat and horizontal position" electrode is used, ¼-inch diameter at 300 to 340 amperes producing approximately a 5/16-inch fillet weld at 8 to 10 inches per minute travel speed.

It is not necessary for the operator to maintain a physical length of arc once it has been established. Since the flux coating of the electrode is insulated, its "cupping" characteristic provides the correct arc length so the operator can rest the tip of the electrode against the work continually during the welding, allowing the electrode to advance along the seam as it is consumed. This produces approximately an inch of weld per inch of electrode.

If a second or subsequent passes were required, it would be necessary for the operator to maintain a physical length of arc for these passes. For this work, the parts are mounted on the positioning equipment with the turntable in a horizontal plane. The table is next tilted manually to a 45-degree angle and then driven by a variable speed motor at welding speeds. The operator controls the speed of rotation by means of a foot switch.

In the case of subassemblies, such as the inner water chamber, the work is light enough to be handled manually from the floor conveyor to the positioner. As these assemblies increase in size through the addition of the combustion chamber and later the outer shell, they are swung into place on the positioning fixture by jib cranes. To obtain maximum efficiency and relieve the welder from fatiguing assembly operations, the assembly operations are segregated from the welding operations whenever possible along the line. Minor assembly and tacking operations are done while work is on the conveyor. Major operations are done with work removed from the convevor.

For the necessary connections between the inner and outer units, such as flue connections, sight door and burner sleeve as well as for external fittings, both $\frac{5}{32}$ and ¼-inch diameter electrodes of the "all position" type are used at 200 to 220 amperes and 280 to 300 amperes, respectively. In many cases the use of ¼-inch electrode is impractical because of the relatively short welds of constantly changing contour. The predominant size of weld is a 5/16-inch fillet, joining ¼ and 5/16-inch plate.

Each boiler is subjected to a 60-pound hydrostatic test at three different stages of manufacture. A final test is conducted for an insurance company inspector who puts the ASME boiler code stamp of approval on the boiler.

The construction of the warm air line of furnaces is not yet regulated by any code, so manufacturers are free to use any plate thickness desired. Here again arc welding plays the major role, being used on all

(*Please turn to Page* 105)

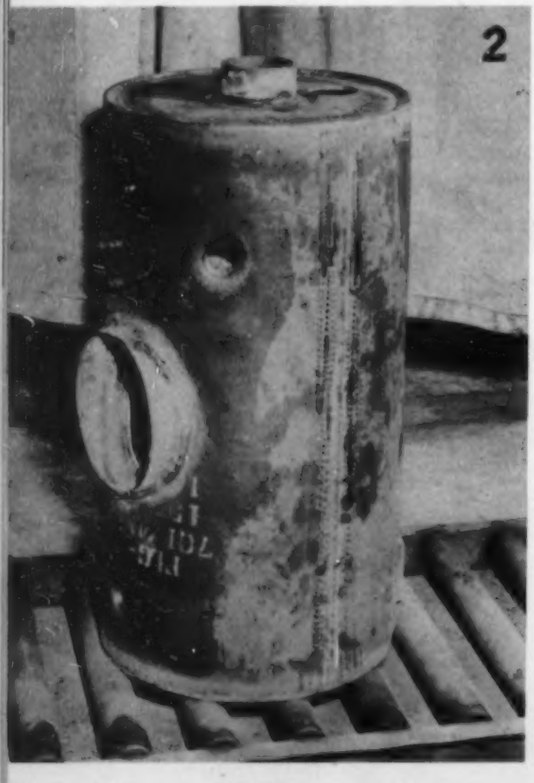

Fig. 2—Combustion and outer shell assembly of steam and hot water boiler showing flash welded longitudinal seam and arc welded sight door and top plate

Fig. 3—Combustion chamber assembly of steam and hot water boiler mounted on motor operated welding positioner

Fig. 4—Resistance welded fins, arc welded secondaries and flue passes on combustion chamber and secondary heat transfer surface assembly of warm air furnace

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AUTOMATICS

HIGH-IRON CHARGES in Open-Hearth Practice

By LEWIS B. LINDEMUTH
Consulting Engineer
140 Cedar Street
New York

Need for charging more molten iron at American open-hearth shops is becoming more urgent because of the scrap supply

HANDLING of high-iron charges is, to my mind, the major problem confronting the open-hearth producers today. The scrap shortage is permanent and we will never again, except in scattered instances, return to the operating conditions that we have heretofore considered normal. We are dipping exhaustively into our normally future scrap supplies and thereby, for the present, partially staving off the problem and maintaining production. This is proper because now is the critical time while we wait for the product of the new blast furnaces. It is also a time we must take advantage of to work out what we are going to do when high-iron charges are the normal condition.

High-iron charges may be spoken of as a ratio of iron to scrap, or the iron proportion may be based on the total metallic charge, including the iron in the ore. It makes considerable difference because the ore used, with any given ratio of iron to scrap, varies considerably. Silicon in the iron, the nature of the ore, the quality of the scrap, depth of bath, speed of the furnace and the grade of steel being made, are the principal factors affecting the amount of ore used in the charge.

From the open-hearth operators' point of view, the ratio of hot metal to scrap is the most informative basis for discussion because it eliminates local conditions and classifies clearly the basis they are working on.

For example, if the percentage of hot metal based on hot metal and scrap is 70, the makeup of a charge, under a fixed set of conditions with the only variable being silicon in the iron, will be:

Silicon, %	Hot metal, %	Scrap, %	Iron from ore, %
0.70	65.5	28.0	6.5
1.00	63.7	27.3	9.0
1.30	62.3	26.7	11.0

A difference in the grade of scrap under these conditions will, between good heavy melting and light rusty scrap, represent a difference of 8 per cent in the amount of ore charged, with silicon in the iron at 1.00 per cent. For accounting purposes, however, the inclusion of the iron in the ore in the "metallic charge" is necessary. Unless otherwise stated, the percentage of hot metal in this discussion will mean the percentage in relation to pig and scrap only.

Sixteen years ago in Australia 20 per cent scrap, 80 per cent hot-metal, and hematite ore containing a fair percentage of lumps were available for charging. The practice at that time was to charge sufficient limestone to make a slag without a "run-off." This meant a slag volume of about 30 per cent. In order to produce at a rate consistent with United States practice, the furnaces were driven, which resulted in abnormally short furnace lives and high fuel. Hot metal analysis follows:

C	— 3.85%
Mn	— 2.25%
Si	— 0.75–1.25
P	— 0.08–0.10
S	— 0.04

The duplex process was considered but given up because of several ob-

Table I—Analysis of Typical Run-Off Slags

Heat No.	Fe	SiO_2	P_2O_5	CaO	CaO / P_2O_5	Solubility of P_2O_5—%
RICHARD THOMAS—REDBOURN WORKS						
F-212	10.5	16.0	21.5	29.0	1.34	26.71
Same 25' later	10.0	16.0	25.7	34.0	1.71	84.62
Same—end run-off	9.2	11.6	16.8	36.8	2.18	84.35
	8.0	14.8	17.2	33.0	1.91	90.63
	18.5	10.0	21.1	28.1	1.33	32.60
	18.0	9.5	22.2	28.5	1.28	34.41
	14.5	12.0	18.7	28.6	1.52	41.72
	21.2	10.2	18.8	31.4	1.66	92.61
LYSAGHTS—NORMANBY PARK WORKS						
H-591	25.7	14.8	18.8	12.4	0.66	18.0
H-469	28.5	14.5	19.0	11.5	....	16.0
G-345	31.4	11.5	19.6	8.4	....	22.0
G-275	29.8	16.7	19.5	18.1	....	26.0

This paper was presented at the annual conference of the Open-Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Netherland Plaza hotel, Cincinnati, April 16-17.

A New Principle Cuts Pig Casting Costs

Bailey

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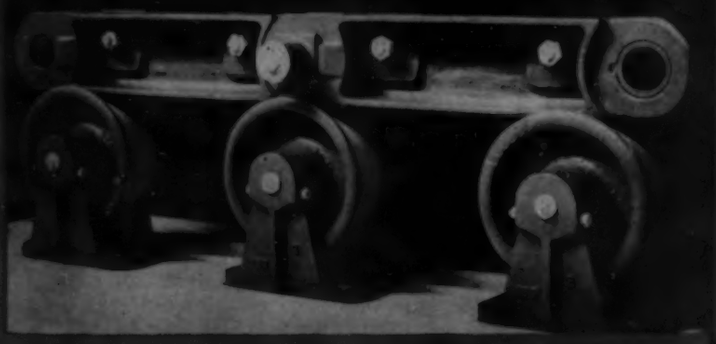
Every feature of the Bailey Stationary Wheel Pig Casting Machine is designed to give maximum speed and flexibility in casting, long continuous service under top-speed operating conditions and an absolute minimum of maintenance.

Why not have a Bailey engineer go over these facts with you or write for the descriptive bulletin today?



Outside view of chain link shows why no movement occurs in links during travel except when passing over the sprockets. Spacer rods maintain accurate alignment.

Pegged, cast steel links are twice mold length (24") . . . so only half as many moving parts . . . move only when passing over sprockets . . . have quickly replaceable pins and bushings.

High manganese steel pins and bushings take all the wear . . . give maximum service . . . are quickly replaceable and interchangeable.

WILLIAM M. BAILEY COMPANY

ENGINEERS

PITTSBURGH, PENNSYLVANIA

Table II—Data on High-Iron Charges in Basic Open-Hearth Practice

Silicon in hot-metal, %	RATIO OF SCRAP TO IRON IN THE CHARGE 40 : 60 Per cent ore	40 : 60 Metallic charge % pig & scrap	40 : 60 Ingots from 1-ton pig & scrap	30 : 70 Per cent ore	30 : 70 Metallic charge % pig & scrap	30 : 70 Ingots from 1-ton pig & scrap	20 : 80 Per cent ore	20 : 80 Metallic charge % pig & scrap	20 : 80 Ingots from 1-ton pig & scrap
0.40	6.0	103.0	0.945	10.1	105.1	0.955	14.5	107.8	0.979
0.60	6.9	103.5	.....	11.5	105.8	.....	16.0	108.0	.....
0.80	8.3	104.7	.....	13.0	106.5	.....	17.8	108.9	.....
1.00	10.0	105.0	.....	15.0	107.5	.....	20.0	110.0	.....
1.20	12.0	106.0	0.970	17.3	108.7	0.985	22.7	111.4	1.014

jections. One of these, the high manganese, was not disclosed to not be a major objection until about 1936, when tests made at South Chicago revealed that 2 per cent manganese could be blown without major difficulty. By that time the high iron charge was working so satisfactorily and economically, that there appeared little or nothing to be gained in cost with the duplex process.

Australian open-hearth proceeding today is as foolproof as any open-hearth process can be, and they would consider it a hardship to have to go to a 50 per cent scrap charge. Ratings of their basic stationary furnaces and size of heats follow:

Furnace No.	Rated capacity, g.t.	Size heats tapped, g.t.	Length between knuckles, ft.
10	65	120	34
3	100	140	36
4	150	150	44
2	175	250	44
1	200	300	46

Annual production, 2,100,000 gross tons ingots. Ingot yield, 89.0 per cent.

On account of the size of the heats for the size of the furnaces, these baths would all be considered deep.

Charging procedure under present practice using a runoff slag, 80 per cent hot metal and 20 per cent scrap, follows:

1. A thin layer of scrap is charged on the bottom for the purpose of preventing stone from sticking.
2. Limestone next. 5½% of stone regardless of silicon in iron. (Burned lime is not satisfactory.)
3. Lump ore, nothing under 1". The amount of ore depends upon silicon in iron and other considerations.
4. The balance of the scrap.

A heating interval of 2± hours for the smaller furnaces, and 3± hours for the larger ones.

5. *All* of the hot-metal as rapidly as possible.

One of the essential considerations is to secure a complete runoff slag before the lime starts to come up. Whatever is done in the way of charging times, sequences, hot-metal additions, etc., must be done to further this objective. After the slag settles down, the finishing of the heat is about the same as any other.

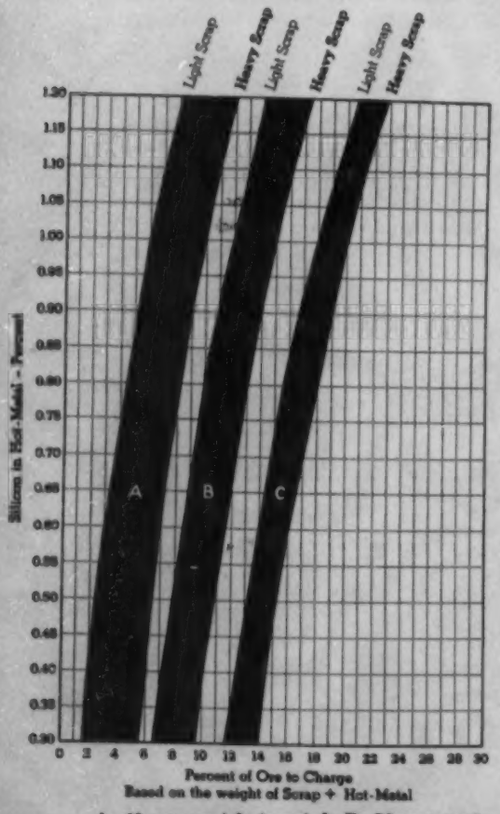
The interval between charging the scrap and adding hot metal is such that the scrap is heated to above the temperature of the hot metal. It is the point where the exposed scrap is dripping fairly freely.

The ore by then should be heated clear through the pile, but the limestone should not have been calcined to any great extent. When the hot metal is added, all of it should go into the furnace without delay between ladles. 10 to 20 minute intervals should be ample time, but sooner if possible.

When the metal first is added it usually lies quiet for several minutes during the beginning of oxidation of the silicon. When the carbon reaction starts, the slag boils up until it gets above the slag hole level where it runs from the furnace. This reaction lasts for 30 to 45 minutes, after which the slag settles down.

During this boiling interval, all of the slag possible must be given a chance to get out of the furnace, which means that the slag hole should be large enough for a fast flow. The "hunch" holes, which I have seen in this country, are entirely inadequate. The holes should preferably be flat on the bottom side and 18 inches or more long, and so arranged that the level can be altered by building up with dolomite or tearing down to correspond with the condition of the furnace bottom.

A round slag hole, large enough to take off the slag in the time available, permits metal to run out with the slag. The 250-ton furnaces have two slag holes, one on each side of the tap hole, but far enough away not to interfere with tapping. The slag hole should be about 6 inches higher than the level of the metal in the furnace when the heat is melted. The slag holes on all of the Australian furnaces are on the tapping side and the slag runs into thimbles in the pit. A man is stationed at the slag hole during the entire run-off period to keep the slag flowing properly or to raise the level if metal comes over.



A, 60 per cent hot metal; B, 70 per cent hot metal; C, 80 per cent hot metal

Graph showing amount of charge ore for different percentages of hot metal, for silicon content of hot metal and for different grades of scrap

Charge Ore

Equally important with procedure is the physical condition of the charge ore. *Lumps or the equivalent is the only form that has been possible to use.* The reason being that a pile of fine ore cannot be heated in the open-hearth furnace within a time which would permit maintaining a normal production rate.

In this country the lake ores are fine and also contain considerable moisture. During the interval between charging and adding hot metal it is not heated sufficiently to drive off this moisture. Hot metal poured in on this results in one or more of the following, in varying degrees:

1. Violent "blows."
2. Chilling the heat, thereby delaying it.
3. Floating the ore out with the run-off slag, lowering the yield.
4. Finally melting at almost any carbon content.
5. Damage to the furnace bottom by having a high silica finishing slag, due to an interrupted run-off slag.

Fine ore, even though not wet, is still impossible to heat except on the surface of the pile. This results in "blows". They are usually much less violent than with wet ore, but are frequently deferred, often as much as several hours after the hot-metal addition.

At times heats about ready to tap and which have been ored, sud-

(*Please turn to Page* 109)

PHOTO BY U.S. ARMY SIGNAL CORPS

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Ohio Seamless Tubing gears up routine to meet vital new responsibilities . . . Performance under fire . . . to that end steel tubing can make a most vital contribution to the production of firearms. It accounts for the *variety* of applications to firearms manufacture for which Ohio Seamless Tubing is now being used. Nor is accuracy the whole story. The rest is speed in manufacture—more guns, faster! That means geared-up routine to help meet ever-increasing demands of top-rating priorities. Precise machining to close tolerances, uniform workability, accurate sizes and gauges, smooth surfaces inside and out—all these qualities make for high speed production. So when the Army and Navy specify that tubing must be straight, sound, clean, and free from pits, scores, and other surface imperfections of any nature, Ohio Seamless Tubing can fill those requirements at a far greater pace than ever before. All this adds up to a vast new experience in the manufacture of Ohio Seamless Tubing to help you meet post-war reconstruction requirements.

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AN EXAMPLE of the present trend toward use of built-in handling equipment to facilitate processing machine operations is a 3-station revolving indexing table that handles work in and out of a 3-column hydraulic press manufactured by Williams, White & Co., Moline, Ill., and shown in Figs. 1 and 2. This table permits one man to load work into dies and another to remove formed work from dies while the press ram descends automatically to form work at a third station. This greatly increases production of the press since it does not have to remain idle while being loaded and unloaded.

The table is 102 inches in diameter and is fitted around one column of the press. It passes over the press bed and is arranged so when ram descends the force is transmitted through the table to the bed. Table can be set to work stopping at three stations each 120 degrees apart or at two stations 180 degrees apart.

When the press is set for the 3-station operation, each of the two operators has a floor-type pushbutton. These can be seen in Fig. 1. They are connected in series so that both must be actuated before the automatic press cycle starts. When work has been loaded upon the empty die or dies at the first station and formed work stripped from die or dies at the third station, operators press pushbuttons and table automatically indexes 120 degrees so that work just loaded into die at first station is moved to second station, which is under the press ram; formed work from ram comes to third station to be stripped from dies, and empty dies move from third station to first station where they are ready to be reloaded.

As the table indexes, it passes over an indexing pin and then backs up against it. This motion energizes the solenoid control of the press, which starts the down movement of the press ram. The backing-up feature of the table against the pin is a patented construction which permits fast travel of the table to the work and yet eliminates any possibility of shock due to overcoming inertia of the table against a stop. The back-up motion of the table is produced by the same forward-motion motor but with extra resistance thrown in the power circuits to slow down the movement.

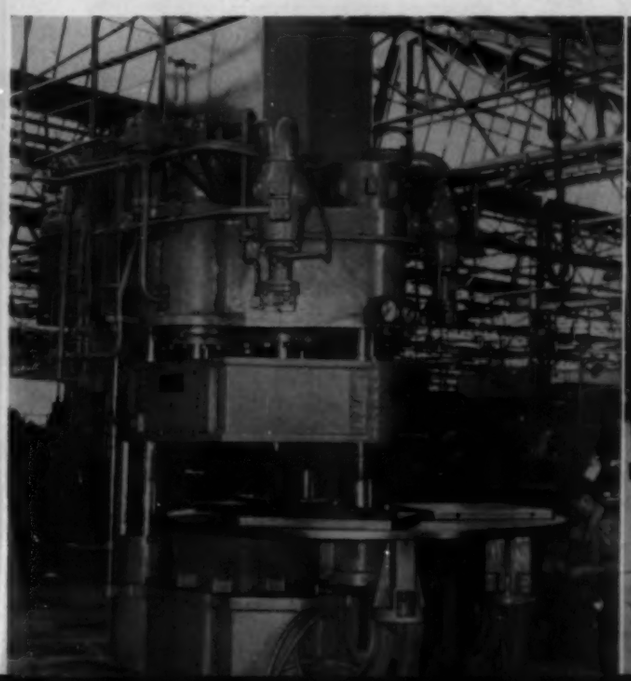
After the press solenoid has been tripped for a down stroke, automatic controls operate to build up maximum pressure, to reverse ram, and to return it to top of stroke, where automatic cycle ends. As the ram descends, ascends and then stops, first and third stations are being loaded and unloaded by the two operators. Fig. 2 shows die being loaded by operator at right and completed work being removed at left. Ram has formed piece at second station and cycle has ended, to be repeated only when both operators have completed their tasks and again pressed their pushbuttons. This timing sequence is necessary as the bulk of the time between press strokes is required by operators stripping formed pieces from the die or dies and placing new blanks on the other die or dies.

The press illustrated is in operation in a west coast aircraft plant. It has a capacity of 1200 tons on the main ram with travel at this tonnage of 12.7 inches per minute. But two speeds are provided so unit can also exert 390 tons at a travel speed of 40 inches per minute. At rapid traverse or no load, ram speed is 550 inches per minute. The work shown can be done at four cycles per minute when pressing at the maximum of 1200 tons. The 2-tonnage feature can be utilized to allow faster operation at lower pressure for it will permit five cycles of the press per minute, at a maximum pressure of 400 tons.

(Please turn to Page 106)

Fig. 1—(Left, below)—Operator setting up 3-column hydraulic press which features revolving work table to carry work under press ram automatically

Fig. 2—(Right)—Closeup of revolving table in operation. The table indexes 120 degrees automatically as soon as the first operator removes the formed work from the die and the second operator has reloaded the die at his station, the indexing movement being started by the operator pressing a pushbutton at each station



SILVER PLATING

. . . . as a substitute coating in the present emergency

By DR. C. B. F. YOUNG
Consultant
And
Adjunct Professor
Brooklyn Polytechnic Institute

A GREAT CHANGE has taken place in American industry. The use of most metals ordinarily employed in electroplating is prohibited except for ordnance work. No longer can we apply on ordinary articles a copper-nickel-chromium plate to protect steel against corrosion.

What metals can be used to replace electrodeposits of nickel, chromium, copper, tin, cobalt, zinc, cadmium, etc., is the question asked by many manufacturers today. The answer will be found in the electromotive series shown in Table I.

Lithium, rubidium and potassium are too active, too expensive and have very little mechanical strength. The same comment applies to strontium, barium, calcium and sodium. The next three (magnesium, aluminum and beryllium) are very interesting because they are comparatively strong and light. However, they cannot be plated from aqueous solutions. Therefore, they cannot be considered from the point of view of plating.

Uranium is too expensive, is heavy and white colored. Deposition of this element is rather difficult also. Manganese can be deposited from aqueous solutions. It is being done commercially today. However, the material tarnishes quickly in the atmosphere. This alone would eliminate the metal from the plating plant.

Zinc and chromium are both platable elements but it is difficult to obtain these materials in large quantities without top priority ratings today. Chromium can be used in extremely thin deposits, but an intermediate plate is desired. Gallium is a rare metal belonging to the aluminum group which is expensive and limited in amounts available. Also it has a low melting point of 29.75 degrees Cent. Iron comes next, but it is the one material which we are desirous of protecting.

Cadmium can be used for plating many base materials, but it cannot be considered due to priorities. Indium is a soft rare metal of the zinc group selling for $7 per ounce. It can be cut with the finger nail. It does have some industrial application when used in conjunction with silver. However, this use involves a heat-treating operation which is not desired. This material does have possibilities, however.

Thallium, a rare metal, is related to lead, being somewhat softer and more active. It will tarnish in the air and its salts are poisonous. Cobalt, nickel and tin are all on strict priorities. Lead is generally too soft for protective coatings, its salts are poisonous and the metal readily oxidizes in the atmosphere. The material is hard to clean and has a tendency to aid in the production of poorly adherent deposits. However, this material does have possibilities for some uses.

Hydrogen is a gas. Antimony, bismuth and arsenic all are brittle in the pure state. Antimony and arsenic are also very poisonous. Copper, again, cannot be considered because of priorities. Polonium or radium F is just a laboratory curiosity and cannot be considered as a commercial possibility.

Silver is an interesting metal that is available in appreciable quantities. Too, it can be deposited from several types of solutions. It is selling for approximately $0.37 an ounce. This material is being produced in increasing quantities because it is a by-product of the copper, zinc and lead industries. Silver definitely offers important possibilities. Palladium, platinum and gold can be deposited, but they are entirely too expensive for commercial consideration.

Looking over the series it will be seen that there are only two metals which can be seriously considered. These are lead and silver. Lead is under some restrictions and possibly will become harder to obtain for commercial use. It is also rather soft and has a tendency to drag when being buffed. The salts are poisonous and the plate must be used with discretion. Too, the plated coating itself is rather dark and marks almost everything that contacts it. Such properties make lead a poor possibility for general application.

Silver coatings, on the other hand, have a most attractive appearance either polished or unbuffed. This element has intrigued man for centuries. The warmth of sterling silver is universally known and appreciated. The metal can be deposited from both acid and cyanide baths comparatively easily. Since the production of silver is ahead of consumption, its price of $0.37 an ounce may be lowered still further.

The total silver produced in the Western hemisphere in 1941 was over 200,000,000 fine ounces. (1) From these statistics it can be seen that here is one metal which shows a surplus. To be sure, it is not very much when considered in tons, but a pound of silver will cover a large area when used as an electrodeposited coating.

From this information it would appear safe to say that silver is going to take the place of commercial nickel, cadmium, zinc, tin and perhaps other electrodeposited coatings. With this in view, a resume of silver plating will be given which, it is hoped, will act as a guide to those hoping for substitutes for metals which have enlisted in the war effort.

Silver has an atomic weight of 107.88, a melting point of 960.5 degrees Cent., a specific gravity of 10.5 and a valence of one. It is both malleable and ductile. The pure metal is the whitest metal known to man and possesses a beautiful soft luster which is exceptionally pleasing. The electrical and heat conductivities of this metal are above all others. The material is unaffected by oxygen but is readily attacked by sulphur compounds which produce the well known silver tarnish, Ag_2S.

This metal can be deposited from aqueous solutions with ease as one would expect from its position in the electromotive series.

Type of Bath: Silver can be deposited from several baths, but only two are of commercial importance, and one of these is used in almost all instances. The cyanide bath is preferred by most platers as the best all around bath and so merits most attention. The iodide bath finds some special application and will be mentioned.

The cyanide bath contains silver cyanide, free cyanide and carbonate in the solution. In some cases a brightener is added. The materials in a silver bath can be used over wide ranges. In other words, it is easy to deposit silver. A look at the electromotive series will show this to be true if one bears in mind that the lower in the series a metal appears, the easier it is to deposit that element. A good formula which can be used for general plating is as follows: Silver cyanide (AgCN), 5 ounces per gallon (avoirdupois); potassium cyanide (KCN), 7.5 ounces per gallon; potassium carbonate (K_2CO_3), 4 ounces per gallon.

This bath should be used with 999 fine rolled annealed silver anodes at 65 to 85 degrees Cent. The cur-

(*Please turn to Page* 107)

PENNSALT CLEANERS

help speed defense production . . . SAVE MEN

A prominent automobile manufacturer, now engaged in war production, has achieved these four striking advantages in cleaning metal parts by switching from hand cleaning with tools, brushes and a solvent to the use of a special cleaning machine containing a solution of a Pennsalt Cleaner:

1. A substantial saving in man hours of cleaning time . . . 8 men, with a Pennsalt Cleaner solution in a special cleaning machine, accomplish what 75 men did manually before.
2. Elimination of fire hazard of previous cleaner . . . an opportunity for reducing fire insurance costs.
3. Savings in the total space occupied by the cleaning department.
4. Removal of hard carbon deposits, grease and other foreign matter rapidly and efficiently from metal parts.

In many manufacturing plants all over the country, production is being speeded by the use of Pennsalt Cleaners . . . in some cases, to shorten each step in the metal cleaning cycle . . . in others, to eliminate whole operations by cleaning several metals with one Pennsalt Cleaner.

To meet widely varying problems of metal cleaning, we offer a complete series of Pennsalt Cleaners . . . each with exceptional dissolving and emulsifying action, lasting power, and cleansing qualities.

Let our technical representative discuss with you the proper Pennsalt Cleaners to save *you* men and money. Write *today* for full details to our Pennsalt Cleaner Division, Dept. S.

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

1000 WIDENER BUILDING, PHILADELPHIA

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RECONDITIONING OIL TANKS

. . . . by simplified arc welding method

WAR has made it imperative to place all storage or working tanks used in the petroleum industry back into active service immediately. An effective method has been devised by E. G. Woolman, welding foreman, Cities Service Oil Co., Ponca City, Okla., for reconstructing tank bottoms by arc welding.

These tanks—used for gasoline, naphtha, kerosene, gas oil, and crude oil—had leaky and corroded bottoms. Steaming, of course, is first necessary to remove all vapors and oil to prevent any possibility of a fire or explosion. After being steamed, old bottom is cleaned with fuller's earth. The ¼-inch thick plates for the new bottom are moved inside the tank without taking out a door sheet by cutting a 6-foot by 6-inch section out of the side of the tank near the bottom.

Accompanying diagrams show method of reconstruction. Details of the bottom in Fig. 3 illustrate how each plate overlaps—except by 3 inches at each end where the notch is butt welded to the adjoining sheet to form a smooth and flat surface around the edge. Only one pass with a 5/32-inch mild steel rod is necessary for joining these ¼-inch plates.

After new bottom is placed, the 12-inch slanting plate, shown resting on the flat outside surface in Figs. 1 and 2, is welded to it. Two beads are run at the top and bottom of the slanting plate. Top of the slanting plate is joined to the side of the tank, and the bottom to the new bottom as shown.

At each rivet seam, a notch ¾-inch high and 3 inches long was cut out so that the inside of the notch could be welded. See Fig. 2. This prevents any liquid from seeping in back of the rivets, running down the seams in back of the slanting plate or underneath the new bottom.

After the new bottom is installed, the section cut out to act as door sheet is welded back into place. There is no need to make this weld tight since it has been cut below where the slanting plate on the inside has been welded liquid tight.

Cost for reconditioning a 52,000-gallon tank by this method was $576.68. This amount is some $230 under cost of installing a new bottom by a conventional method. Cost figures include labor and material in both instances.

Corrosion has always been most severe around the bottom angle iron and old rivets—even extending sometimes 3 or 4 inches up on the sides of the tank. This method of reconstruction tends to prevent such corrosion and forms a new bottom that will not pull or break away from the sides since the liquid is free to work around due to the slanting plates.

This story won a prize in the arc welding news contest sponsored by Hobart Brothers Co., Troy, O.

Aluminum Cleaner Cleans Without Etching

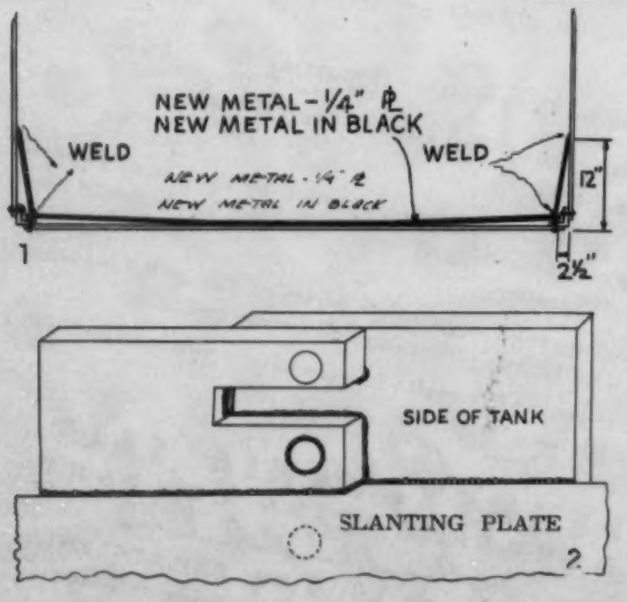
A new soak cleaner, called Mattawan A1, for cleaning aluminum and magnesium in either sheets or castings is being offered by Hanson-Van Winkle-Munning Co., Matawan, N. J. It does not produce any weight or etch loss of the metal after two hour's immersion providing the temperature of the bath does not exceed 160 degrees Fahr., and the concentration of the cleaner is not more than 4 ounces per gallon.

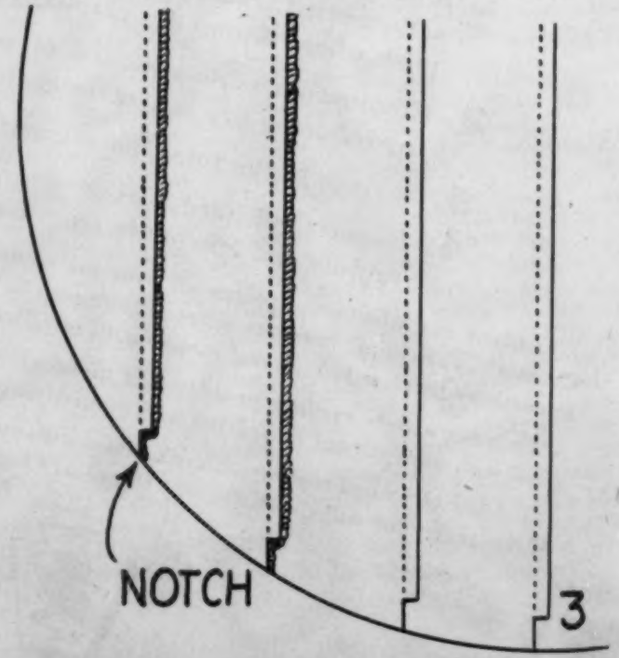
In a number of tests on greasy production castings, the time required for thorough cleaning was ½ to 4 minutes. At 175 degrees Fahr. the cleaner will etch slowly, rate of etch increasing as the temperature is increased thereafter, according to the company.

Fig. 1—Cross section of tank bottom showing how new plates are applied to replace old bottom

Fig. 2—Inside view showing how tank rivet seam has been cut and sealed with weld metal. Rivet head also is seal welded. This precaution prevents liquid from seeping in back of the rivets or running down the seams in back of the new slanting floor plates

Fig. 3—In laying the new bottom, a notch is cut at each end of overlap so that surface around edge of floor will be smooth and flat when plates are welded, the plates being bent down for butt welding around edge of floor as shown





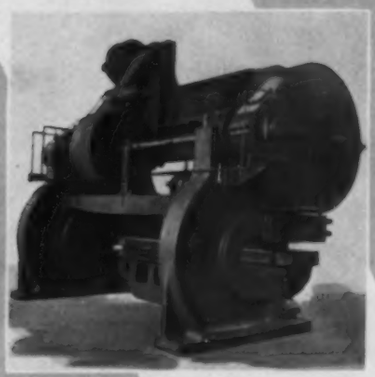
GO RIGHT DOWN THE LINE OF STEEL MILLS

and you'll find

ROPER

ROTARY PUMPS

Operating Hydraulic Mechanisms and Lubricating Systems



HYDRAULICALLY BALANCED

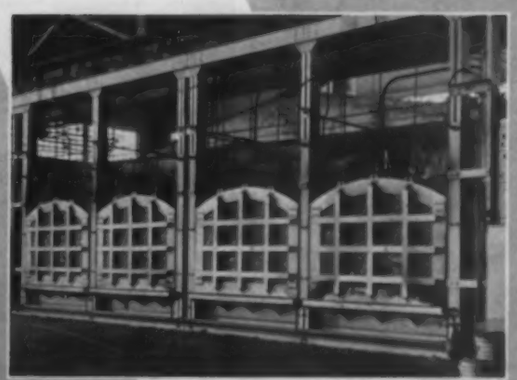
this seal

appears on every Roper Hydraulically Balanced Pump. It assures higher efficiency, quieter operation, greater dependability and longer life.

WRITE FOR CATALOG 948

with illustrations, cut-away views, drawings, dimensions and pumping capacity tables and complete information on Roper Pumps. The Roper line offers 7548 installation possibilities giving users what practically amounts to custom-built performance at standard model prices.

They didn't leave the selection of pumps to guesswork



GEO. D. ROPER CORP., ROCKFORD, ILLINOIS

PITTSBURGH OFFICE, 207-209 BLVD. OF THE ALLIES

Industrial

Screw Machine Box Tool

Poyar-Schultz Corp., 2110 Walnut street, Chicago, has placed on the market a new automatic screw machine box tool designed for faster production. Offered in three sizes, 00, 0 and 2, it is easy to set up. Body of the tool is forged alloy steel. Its roller blocks are made in two differ-

ent heights—individually adjusted. The tool bit holder holds the bit so it is always tangent to the work. A positive screw feed adjustment permits quick set ups. A roller block wedge serves to both tighten and release both roller blocks with a single movement. Tools are being offered for either hand or automatic screw machines.

Brazing Unit

Ajax Electrothermic Corp., Trenton, N. J., has placed on the market a new 6-kilowatt frequency self-contained brazing unit for brazing 2-pound bombs. To do this work, it is said to take about one-third of the time required by other methods. After the surfaces of the bomb are prepared, a ring of compound is placed in position. Next,

the assembly is heated by placing it inside the induction ring, and then the parts are brazed, with no residue to clean up. The heat is localized and the joint produced is always the same. The equipment uses high frequency generators and is convertible to other forms of brazing, to melting alloys or sintering carbide tools.

Safety Transformer

Acme Electric & Mfg. Co., Cuba, N. Y., recently developed a safety transformer which is suitable to service two 32-volt alternating-cur-

rent extension lines providing light for workmen who perform under conditions in which explosive gases or vapors exist. It also is said to be particularly adapted for inspection work where workmen must come in contact with moist surfaces or conditions, for the lower voltage prevents severe shock due to defective wires or wiring. Compact and portable, the instrument may be plugged into any ordinary 110-volt alternating-current circuit. It is heavily insulated throughout.

Inspection Device

Designers for Industry Inc., Terminal Tower, Cleveland, has introduced a new, improved machine for inspection of parts. It checks parts by comparison—by superimposing images or composite images of objects or gages. Called the Inspectograph, the device can be equipped with an automatic conveyor and photoelectric cells for inspecting parts quickly to keep up with the pace of some of the war industries. It employs a pair of lenses surrounded by spiral coils of gaseous discharge tubes, and means for successively energizing these tubes in alternate relation with respect to each other rapidly enough to cause the image projected by each lens to persist as a continuous image. Any differences in width, length or depth of the part as against the gage or perfect part is measured by graduations on the adjustment knobs.

Protective Lighting

Westinghouse Lighting Division, Westinghouse Electric & Mfg. Co., Cleveland, announces new Fresnel luminaries for lighting industrial fences and areas for protection against sabotage. These are offered in two types, the SF-180 and the MF-180 for series and multiple circuits respectively. Units can be mounted on poles and building walls and consist basically of a hood with socket and receptacle, mounting bracket, a reflector and lens assembly. The hood is of cast iron. The lower part of the casting has a flange for watershed and breather to avoid creation of a vacuum due to sudden coling of the luminaire by rain.

Moisture-proof felt gaskets form a weather-proof and bug-proof seal between the hood and the reflector. Units with side mounting plates are gasketed with graphitized asbestos.

Sockets and Attachments

Bonney Forge & Tool Works, Allentown, Pa., has placed on the market a new No. V51 18-piece set consisting of extra small sockets and attachments designed especially for adjustments to small nuts and bolts. Its contents include eight sockets with openings from 3/16 to 7/16-inch for adjustments

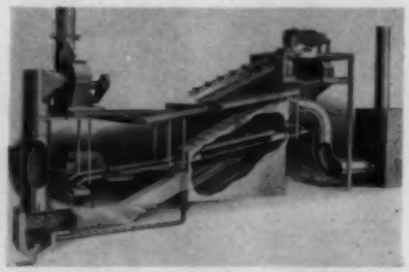
Equipment

to hexagon nuts and bolts; three sockets with openings from ¼ to ⅝-inch for square nuts and bolts; 4½-inch sliding T handles; 2 and 6-inch extensions; 4-inch flexible

extension; 6-inch spinner handle; 5⅝-inch hinge handle and 3½-inch cross handle. Socket walls are thin for getting into close quarters. All attachments are slender for same reason. The entire set is furnished in a pocket-size metal case which measures only 6¼ x 3 x 1 inch.

Coal Dryer

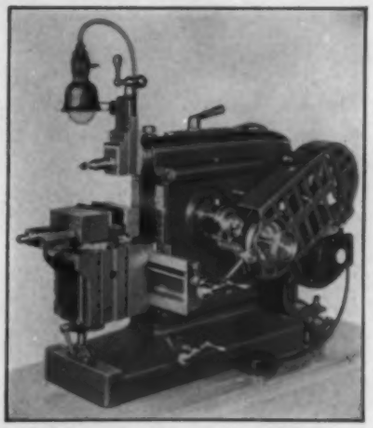
Link-Belt Co., 307 North Michigan avenue, Chicago, announces a new SS dryer for removing surface moisture from sized coal. It combines mechanical dehydration with heat drying, and is available for drying sized coal of No. 10 mesh and up. The new unit comprises a drying chamber with perforated reciprocating-plate drying surface; coal inlet and outlet; hot air inlet from a coal-



fired furnace; and an exhaust fan for drawing the hot air into chamber, over and through the thin bed of coals, down through perforations in reciprocating plate to exhaust stack. Operation of the moving element is analogous to that of a shaker screen excepting that in the case of the dryer the perforations are very small and are intended only for passage of the drying air.

Precision Shaper

Automotive Maintenance Machinery Co., 2100 Commonwealth avenue, North Chicago, Ill., has placed on the market a new 7-inch precision shaper which is available for stationary installation or mounted on a portable cabinet. It features quick adjustments of stroke, feeds, ram position, tool head, speeds, table height and table support. Ways of the ram, tool head and front face



of the main frame are of V type. The shaper's tool head is adjustable and graduated from 0 to 90 degrees for angle work. Its vise is mounted on the table with a single bolt and is held in position with a key. The vise base is provided with slots for three working positions of the table, and it is graduated for any angle from 0 to 90 degrees on either side of center. Feed mechanism is of the reversible and adjustable type, the feeds varying from 0.003 to 0.018-inch. The machine's countershaft has a 4-step V-pulley with separate adjustment for V-belt and motor belt.

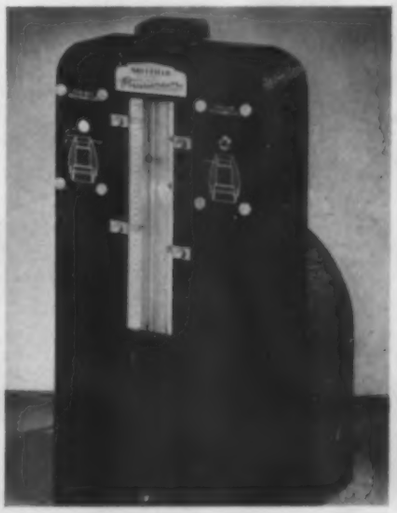
Straightening Press

Watson-Stillman Co., Roselle, N. J., has introduced an improved 125-ton straightening press for straightening gun barrels. It also is suitable for straightening shafting, forgings, etc., being controlled by only one hand lever. Space between columns of the press is 18 inches, vertical opening 17¾ inches. Its stroke is 10 inches. The unit is of the manually movable press type, a handwheel controlling movement of the press along the table, which is 14 feet long, 17 inches wide and equipped with bending blocks, cen-

ters and rollers. Its advance speed is 87 inches per minute, pressing speed 13½ inches per minute and return speed 78 inches per minute. The machine is powered by a radial pump and driven by a 7½-horsepower motor.

Checking Gage

Sheffield Corp., Dayton, O., has announced a new Precisionaire-Electrichek gage for checking external or internal diameters and depths simultaneously. It combines in one housing the features of the company's Precisionaire and Multichek, greatly increasing the sped of inspection. One section of the gage measures the rate of flow of air passing between the gaging spindle and the internal diameter. The other section operates on the same principle as the Multichek with its independent reed mechanism gag-



Typical OF ADVANCED

EUCLID HOIST DESIGN

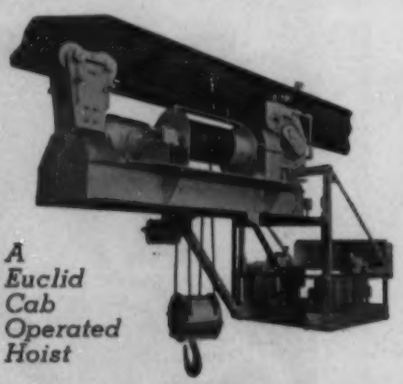
is this easily adjusted

MOTOR BRAKE

THE **poorest** hoist will operate for a time. The **best** hoist after long service will require adjustments.

Means are provided in Euclid Hoists for making every needed adjustment accurately and quickly. Liberal dimensions of all parts lengthens the periods between adjustments. High quality materials permit making necessary adjustments repeatedly. This assures an unusually long period of efficient service.

Newest Euclid feature is the quickly accessible, easily adjusted motor brake. In operation, the liberally proportioned shoes, equipped with metal impregnated linings, respond instantly to the movement of a cam. Close adjustment can be made to stop the motor almost instantly or allow a more gradual stop.



A Euclid Cab Operated Hoist

Write for the Hoist Catalog No. 838 or the Euclid Crane Catalog if interested in this larger type of material handling equipment.

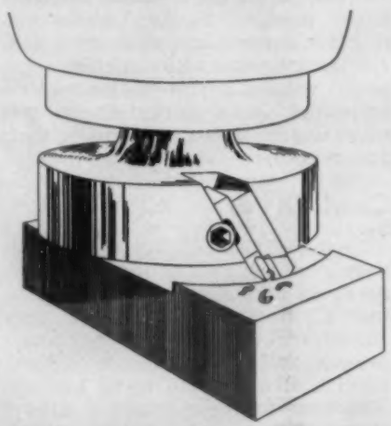
THE EUCLID CRANE & HOIST CO.

EUCLID, OHIO, *Suburb of Cleveland*

ing unit. Although both sections are independent of each other, they work simultaneously. The two indicating tubes are in the center of the gage. Each tube has two markers. They are set at the high and low limits representing the tolerances of the diameters that are being checked. The position of the floats in the tube indicates whether or not the tolerances have been violated. The light center circle at the upper lefthand corner of the gage is the signal light for the Multichek section of the gage. Gaging spindles of both parts of this gage are located at the base, and so placed that the inspector contacts both in one pass. The Precisionaire spindle of the gage shown in the photograph has two orifices, one for each of the internal diameters being checked. Immediately to the left of this spindle is the Multichek gaging spindle. The reed mechanism gaging unit of the Multichek section protrudes from the rear of the housing. The gage is able to check to fifty millionths of an inch instantaneously.

Milling Cutter

McKenna Metals Co., 200 Lloyd avenue, Latrobe, Pa., announces a single-bladed Kennamill by means of



which simple facing cutter heads may be made in almost any shop. Designed with a large negative spiral angle of 35 to 55 degrees and positive hook of 15 to 25 degrees, it is said to mill steel efficiently. For roughing, with cuts up to ⅜-inch deep, a 35-degree negative helical angle and 15-degree positive hook on a 12-inch diameter cutter head works efficiently. For light finishing cuts a negative helic of 55 degrees with 20-degree positive hook angle is suitable.

Punch and Die Holder

Strippit Corp., Buffalo, announces a new model self-contained Wales punch and die holder that punches 3 holes per unit. It provides exact holes for riveting small parts to channeled or flat material. With

individual holders the series of 3 holes can be punched in a straight line or at any angle according to the setup of holders on rails or T-slotted plates. Nothing is attached to the

ram of the press. Die-setting time is a matter of minutes—all that is necessary is to lock holder in position and start punching. Holders can be reset or removed quickly to provide many patterns.

Splint Dressing

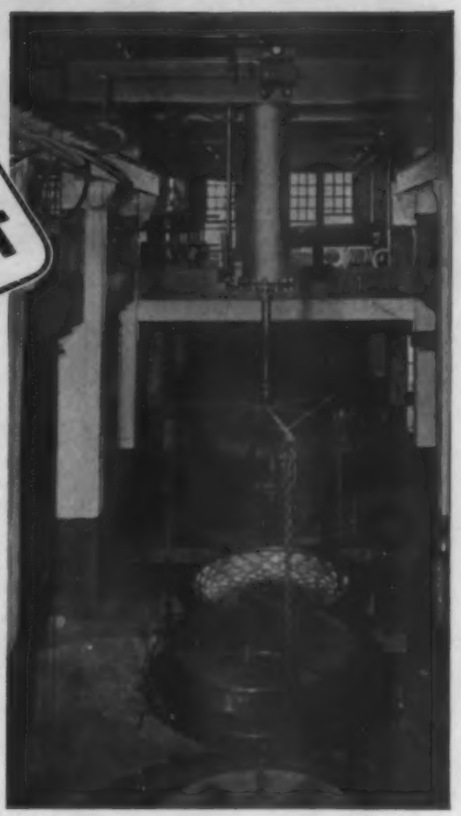
B. F. McDonald Co., 1248 South Hope street, Los Angeles, is offering a new Insta-Splint splint dressing for leg and hip fractures. So quickly is it set in position that any trained first aider may complete a dressing for a hip fracture in less than two minutes, it is said. The device is completely self-contained, including all necessary accessories, even to pads, traction strap and traction pin. No other materials, such as cravat bandages, are required. Feature of the development is its adjustability to the stature of the patient. The framework consists of three sections hinged side by side. The center section fits

under the patient's leg; the inner section folds up to fit the inside of the patient's leg and the outer section has a sliding panel which enables the first aider to adjust this

GOODYEAR

Solves a Production Problem With a

CURTIS Air Hoist



★As illustrated above, the Goodyear Tire and Rubber Company last year solved the problem of handling the movement of heavy tire molds and heater lids with a Curtis Air Hoist. Loads average 30,000 pounds with a maximum of 40,000 pounds per operation. Since the installation of this Curtis Air Hoist in 1940, no maintenance whatever has been necessary.

As in hundreds of industrial plants throughout America, Goodyear recognized the advantages of Curtis Air Hoists:

- Low first cost—low operating expense
- Smooth, fast, accurate control of loads
- Light weight—available in pendant, bracketed, and rope compounded types
- Immunity to abuse or overloading
- Fewer production interruptions for servicing
- One man operation—by ordinary labor

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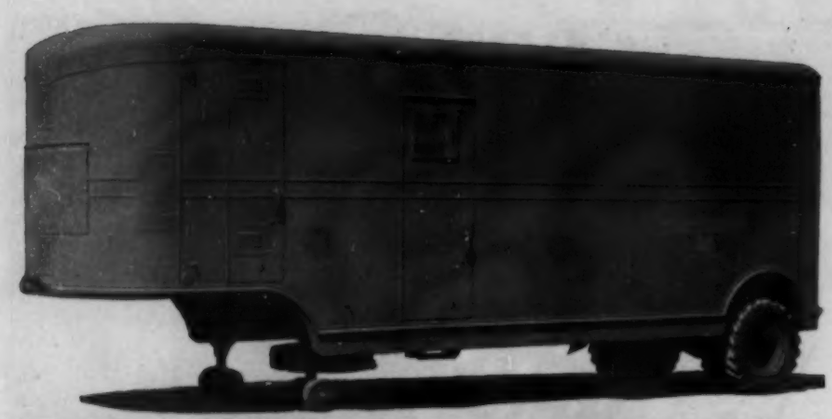

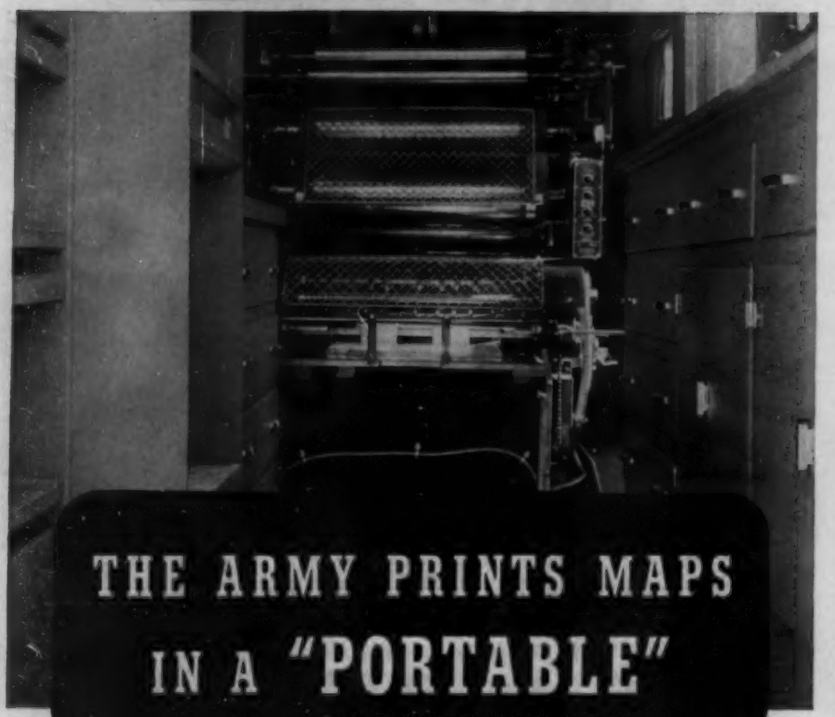

An order comes through—maps are needed now! There's no time to wait while a printing press goes into action miles away. So the Army "rolls its own" right up to the battlefronts.

The photos show a press car ready for service with the field forces. Inside is a complete printing set-up. Outside, ARMCO PAINTGRIP sheets cover the top and other parts of this print shop on wheels.

ARMCO PAINTGRIP is used because this special zinc-coated metal *takes and preserves* paint. Since any color combination may be used, ARMCO PAINTGRIP can be camouflaged effectively. Paint goes on fast because no pre-treatment is needed. The bonderized film insulates paint from the zinc, greatly retarding peeling and flaking.

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TO KEY MEN: Can You Use Sheet Metal Working Data for War Products—and Post-War Plans?

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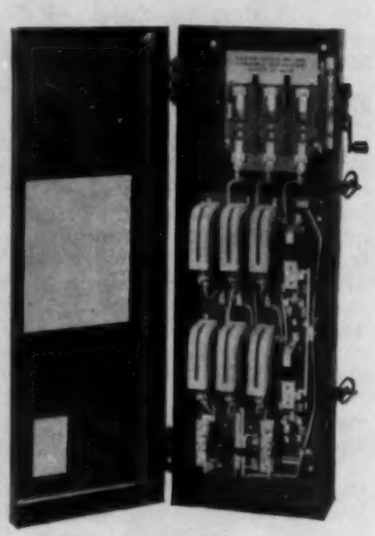
side of the splint to the middle thigh for leg fractures, or to the armpit for femur and hip fractures. Pads protect the patient and straps attached to the inner and outer sections of the split enable the operator to buckle the splint securely in place in a few seconds. In cases where traction is advisable, the traction strap and pin is used. Notches at the end of the device hold the pin in place while applying traction. The Insta-Splint was developed by Paul MacWilliams, director of first aid and accident prevention at Warner Bros. Studio, Hollywood, Calif.

Reversing Starters

General Electric Co., Schenectady, N. Y., has introduced a new line of alternating-current combination magnetic reversing starters for full-voltage starting and reversing of squirrel-cage induction motors. Units in the line consist of two mechanically interlocked reversing contactors, a 2-pole overload relay, and either a circuit breaker or a fusible



or nonfusible motor-circuit switch. Starters are designed to provide full-voltage reversing control and short-circuit protection in one unit. The line includes NEMA size 0 to 4, starters covering single-phase and 3-phase motors in sizes up to and including 100 horsepower at 440 or 550 volts. The fusible forms combine a manually-operated motor circuit switch with clips for cartridge-type fuses. The circuit breaker forms provide simultaneous tripping of all phases on short circuits, and have a trip-free mechanism which prevents holding the breaker closed under short-circuit conditions.

Industrial Truck

Lyon-Raymond Corp., 922 Madison street, Greene, N. Y., has introduced a heavy capacity, hand-operated hydraulic truck for handling long strips of sheet metal. It keeps

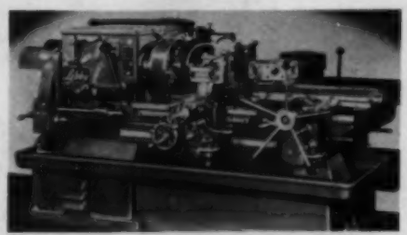
sheet metal at a convenient height for the operator while he is feeding the sheets to a punch press. The truck has a maximum capacity of 10,000 pounds. It is equipped with a 2-speed, hand-operated hydraulic

pump, and also with an attachment to accommodate a towing hitch on the front wheels so that the truck may be moved with aid of an industrial power tractor. The truck also is equipped with a brake, i.e., floor lock, so it may be locked into position when the operator is feeding the sheets into the punch press. It features a 36 x 120-inch table which can be elevated to a height of 36 inches.

Turret Lathe

Libby Division, International Machine Tool Corp., Indianapolis, announces a new No. 4 universal ram type turret lathe which has a collet chuck capacity of 2 inches in diameter, 22 inches in length, and 20 inch swing over ways. It is offered complete with tools for both bar work and chucking work, and will accommodate 8, 10 and 12-inch diameter chucks. In addition, it may be equipped with special attachments.

Both base and pan of this machine is cast integral and comprise one heavy sturdy casting. Spindle control is provided by lever which operates a double multiple disk main drive clutch. The headstock features 12 spindle speeds. These



are controlled by 3 levers mounted on the front of the headstock. One divides the 12 spindle speeds into 2 groups of 6 high and 6 low. The second lever divides the speeds in these groups into two groups of 3 speeds each. The third has 3 positions and is used to select from these groups the particular speed desired.

The motor of the machine is mounted in the base which is

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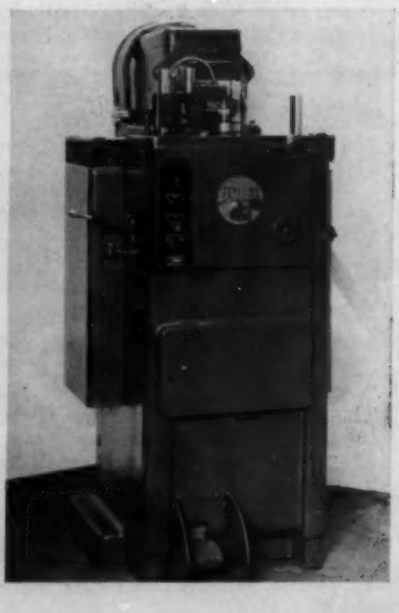
hinged to provide a means for tightening the V-belts. The universal carriage has 6 reversible cross and longitudinal feeds which operate independent of the hexagon turret carriage. Adjustable feed trip dogs are provided for the cross slide, and a 6-screw stop roll is provided for the longitudinal travel of the carriage. The cross slide holds the quick indexing square turret at the front and is provided with three cross T slots at the rear for holding the rear tool post. The rear tool post is used for cutoff and forming operations. Six power feeds to the ram slide in the forward direction are embodied in the hexagon turret ram slide carriage. Feeds are engaged by a quick acting lever on the turret apron. Lubrication is automatically applied to various parts of the machine.

Cutting Machine

Andrew C. Campbell, American Chain & Cable Co. Inc., Bridgeport, Conn., has developed a new wet abrasive cutting machine, the No. 425 Cutalator, specially designed for fast cuts on practically all types of materials up to 3½-inch diameter solid stock and 4½-inch diameter tubing. It is an oscillating type machine effecting a shorter arc of contact through the combination oscillating and rotating movement of the hydraulically fed abrasive cutting wheel. Hydraulically operated work clamps and V-type work holders hold the work securely. A micrometer work stop assures rapid set-up—the machine is fully equipped with a hydraulic stop remover, work clamper and wheel feed. A separate coolant tank, mounted on castors is a big feature of the new unit. The coolant pump feeds water through a shut-off valve to the coolant distributor in any quantity desired.

Gear Generator

Fellows Gear Shaper Co., Springfield, Vt., is offering a straight-line gear generator especially adapted for cutting of fine-pitch gears. It has a capacity up to 1½ inches pitch diameter for spur, and 1 inch for helical gears. Two features of the machine are: The rack-type cutter can be easily made and applied to the cutting of non-involute shapes; it also can be made for "topping"—trimming the outer ends of the teeth to the desired outside diameter. The unit differs from other machines employing rack-type cutters in that there is no intermittent displacement of the rack cutter to complete the gear, cutter travel being continuous. The cutter is held in an adjustable holder which is mounted on the reciprocating and relieving cutter-slide. This cutter-slide is carried in a swivel head, permitting angular adjustment, so that the machine can be used for cutting both spur and helical gears. Reciprocating members are of light weight, and the cutter-slide can be reciprocated at speeds as high as 1500 strokes per minute.



IN CLEANING CARTRIDGE BELT LINKS

SEVERAL years ago when one of the arsenals was developing machine gun cartridge belt links we were asked to recommend the equipment for cleaning them.

These were the requirements: (1) The equipment must remove the heat-treat scale, and any burrs remaining after the punching operations; (2) The surface of the links must be thoroughly roughened to anchor the zinc or Parkerized coating (necessary to prevent corrosion); (3) It must be capable of maintaining a high production schedule; (4) no breakage or damaging of links would be tolerated.

The 27" x 36" WHEELABRATOR Tumblast with rubber apron conveyor, was found to fulfill all requirements, and two machines were installed. They proved so successful in all respects that this equipment has become the standard for more than 95% of all cartridge belt link cleaning jobs.

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Conserves Materials

(*Concluded from Page* 73)

the Sentinel breakers, has always been anchored by two little pieces of nickel wire not more than $\frac{1}{16}$-inch long and about the size of the lead in a pencil. This does not involve a very large tonnage of nickel, but its scarcity has resulted in redesigning to employ spot welding. This will probably give a somewhat better job than before, and it is hoped that the cost will be a little less.

At the Meter Works in Newark, N. J., the outstanding economy as regards critical material is in connection with sockets for outdoor watt-hour meters. These were originally aluminum diecastings, and the large quantities used made a quick changeover imperative. A drawn steel shell is now zinc plated, bonderized by an improved method, and then given an organic finish. This is expected to give reasonably satisfactory service although it probably will not be as good over a long period of time as the aluminum-base diecasting. It again is one of the things which can be seen, and the gradual failure of the finish can be seen and protection renewed by repainting as required.

At the East Pittsburgh, Pa., plant, nearly all of the chromium-nickel steel has been or is being replaced by chromium-molybdenum. Tungsten high-speed steel is also partially replaced by carbon-molybdenum steel. It is not adaptable to blanking dies, so for these a high chromium carbon steel is being used. This marks rather badly, so it is necessary to make dies for stator and rotor punchings out of many small pieces, hardened, assembled and then ground to final shape and size. When cost is greatly increased, it provides a die that does the work.

A domestic substitute made of old rope is now being used instead of Japanese paper (mulberry fiber) for insulating copper wire. Fig. 1 shows paper 0.00085-inch thick being wound aronud the wire as it passes through the spindles. Spun glass is also being used in place of asbestos to insulate copper wire. The operator in Fig. 2 is inspecting the glass strands before they are machine-woven around the wire.

Welding Oil Furnaces

(*Continued from Page* 86)

seams requiring air tightness.

The two main subassemblies consist of a combustion chamber and a secondary chamber, or chambers, for heat transfer. The material used is ⅛-inch copper bearing steel, pickled and oiled to prevent corrosion during processing and also to permit resistance welding without further cleaning. The combustion

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chamber consists essentially of a rolled cylinder with one arc welded longitudinal seam and two heads which are slightly larger in diameter than the cylinder, thereby providing room for readily accessible, external fillet welds.

The individual secondary chambers are fabricated from two preformed sheets to which studs for properly locating an internal baffle plate have been added by resistance projection welding. The outer seams of the secondary chambers, in common with all the arc welding of these furnaces, including the flues joining the combustion chamber and secondary chambers, are welded with $\frac{1}{4}$-inch electrode at approximately 180 amperes, forming a $\frac{1}{4}$-inch fillet weld.

The heating capacity of the warm air furnaces is dependent on the number of secondary chambers and the radiating surface of the combustion chamber. In the larger capacities, preformed fins are resistance seam welded to the outer surface of the combustion chamber, as shown in Fig. 4. These fins are welded at the rate of 30 inches per minute on a 400-kilovolt-ampere seam welder having a throat depth of 30 inches. The length of the welding cycle is accurately controlled by a GE thyratron unit.

Alternating-current arc welding equipment is used throughout for all boiler and furnace work. The almost complete elimination of the troublesome magnetic disturbances sometimes encountered with direct-current welding results in higher quality welding, particularly at the numerous corner intersections. Because of its higher electrical efficiency, the power cost with alternating-current equipment also is approximately half that of a single-operator direct-current motor-generator set.

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Plastic Coating Now Arrests Corrosion

Due to a recent improvement in formula, the builders' plastic coating, Wet-X-Hale, now can be applied directly to rusty steel surfaces without a primer, killing any further corrosive action, according to its manufacturer, Rogear Co., 11 Water street, New York. Application of the product can be made without even cleaning off the rust.

When it hardens, the coating is said to make a seal which prevents the penetration of air or moisture —the elements that promote rust. Nonpeeling, nonchalking, noncracking and fire resistant, the product becomes harder with age, retaining its flexibility, according to the company.

Rotary Press Feed

(*Concluded from Page* 93)

The output of this press depends upon the number of small pieces that are formed at one time. The type of work shown in Fig. 2 is made from a blank 30 inches long by 10¼ inches wide, and usually one piece is formed at a time. On this particular work the largest size piece that can be handled is determined by the size of the 30 x 40-inch rubber pressure pad fitted on the bottom surface of the press ram and acting as a universal female die. This rubber pad and the high tonnage exerted combine to give high quality of work at a high rate of production.

The working face of the bottom platen is 64 inches from right to left by 36 inches from front to back. The area of the die space is 45 inches from right to left and 42 inches from front to back. Daylight opening with ram up is 36 inches. Stroke is 24 inches. A stripping pressure of 30 tons can be exerted.

When table is set to index 180 degrees, one operator handles loading and unloading at one station while pressing is done at the other.

Silver Plating

(*Continued from Page* 94)

rent density should be from 2 to 15 amperes per square foot, depending upon the type work being plated and whether or not agitation is used. The silver cyanide is used to furnish the metallic ions while the cyanide produces a soluble silver salt and at the same time a fine grained deposit. It also reduces the number of silver ions in solution, which prevents the material from being plated out by immersion, which in turn produces deposits adhering poorly.

Some engineers use sodium salts instead of potassium salts and claim that there is little difference in the deposits produced. The former are the cheaper. But from the writer's experience the potassium salts are preferred because of better conducting properties of the bath, higher solubility of the salts, better buffing qualities of the plate produced, and higher current densities permissible.

To obtain some of the better qualities of the potassium and yet produce a cheaper bath, Wood (2) has proposed a bath containing the following: Silver nitrate ($AgNO_3$), 4 ounces per gallon (avoirdupois); sodium cyanide (NaCN), 4 ounces per gallon; potassium nitrate (KNO_3), 16 ounces per gallon. The cost of these materials at the time these comments were prepared was about half the cost of the first formula given. Operating conditions are the same as for the first bath. The solution has many advantages and has proved to be commercially successful.

TABLE I—Electromotive Series

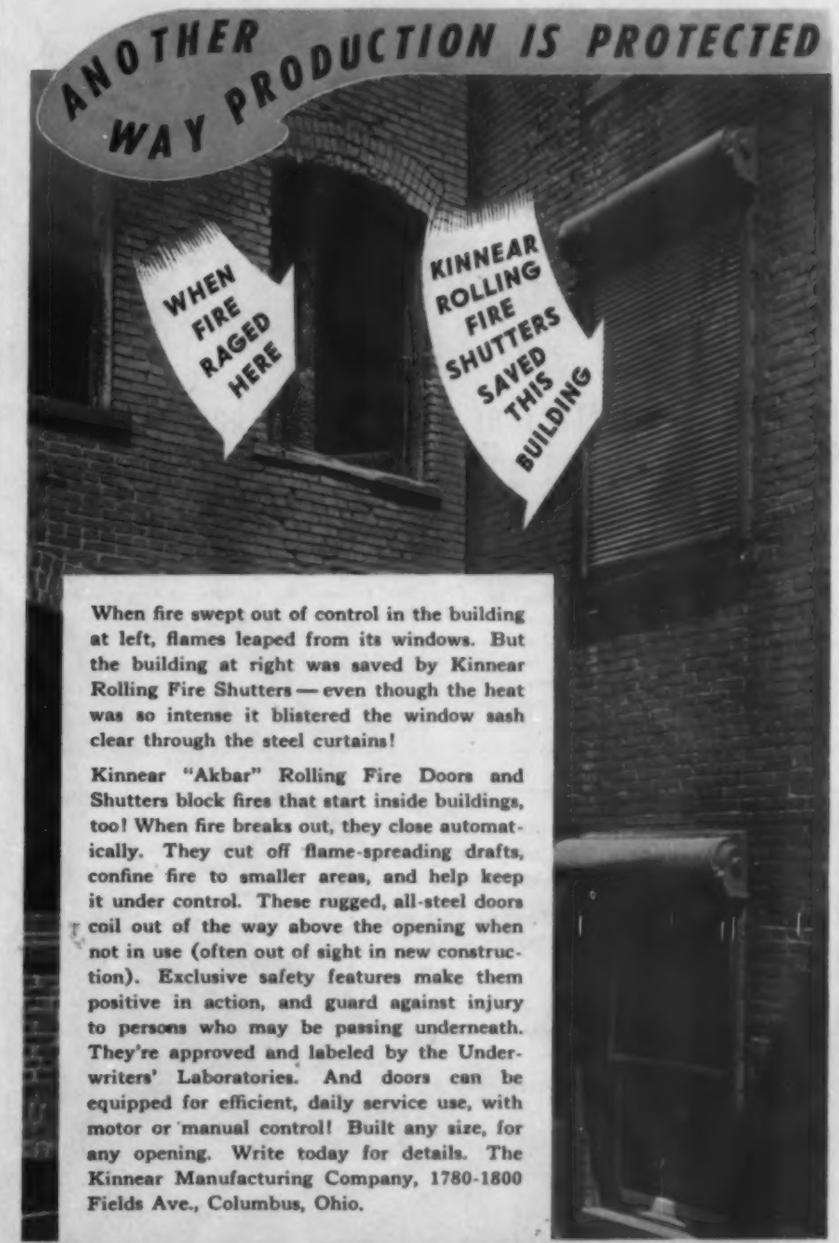
Lithium	Indium
Rubidium	Thallium
Potassium	Cobalt
Strontium	Nickel
Barium	Tin
Calcium	Lead
Sodium	Iron
Magnesium	Hydrogen
Aluminum	Antimony
Beryllium	Bismuth
Uranium	Arsenic
Manganese	Copper (cupric)
Zinc	Copper (Cuprous)
Tellurium	Polonium
Chromium	Silver
Sulphur	Mercury
Gallium	Paladium
Iron	Platinum
Cadmium	Gold (auric)
	Gold (aurous)

The priority situation should be mentioned. Silver is not on the priority list. Sodium cyanide can be obtained in appreciable quantity. Sodium nitrate was placed under a complete allocation system on Feb. 1, 1942, and allocations are carried out under the general preference order M62. Potassium nitrate is not on priorities but is hard to obtain. It can be purchased on the open market, however.

The second type bath contains no cyanide. It is composed of iodides as shown below: Silver nitrate ($AgNO_3$), 3 ounces per gallon; sodium iodide (NaI), 70 ounces per gallon; citric acid ($C_6H_8O_7$), 8 ounces per gallon. This bath is operated at 70 to 80 degrees Fahr., 3 to 10 amperes per square foot. The anodes are 999 fine rolled annealed silver.

Agitation can be used, and sulphuric acid can be substituted for citric acid. It will be recalled that silver iodide is insoluble in aqueous solutions. However, this material is soluble if an excess of sodium or potassium iodide is present, which explains the large amount of iodide. One should keep in mind that when the plated work is removed, it should be rinsed in a concentrated iodide bath; otherwise a precipitate of silver iodide will result. This bath is very expensive but does produce a characteristic deposit which has found special application on watch dials and the like.

Since silver is low in the electromotive series, it has a tendency to deposit out of solution whenever a metal higher up in the series is immersed in a bath containing silver



When fire swept out of control in the building at left, flames leaped from its windows. But the building at right was saved by Kinnear Rolling Fire Shutters — even though the heat was so intense it blistered the window sash clear through the steel curtains!

Kinnear "Akbar" Rolling Fire Doors and Shutters block fires that start inside buildings, too! When fire breaks out, they close automatically. They cut off flame-spreading drafts, confine fire to smaller areas, and help keep it under control. These rugged, all-steel doors coil out of the way above the opening when not in use (often out of sight in new construction). Exclusive safety features make them positive in action, and guard against injury to persons who may be passing underneath. They're approved and labeled by the Underwriters' Laboratories. And doors can be equipped for efficient, daily service use, with motor or manual control! Built any size, for any opening. Write today for details. The Kinnear Manufacturing Company, 1780-1800 Fields Ave., Columbus, Ohio.

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ions. Iron immersed in a silver bath has silver plated out on the iron surface by this action. But the deposit produced is a poorly adhering coat. As more silver is deposited the entire plate lifts or peels, so such a reaction must be prevented. One good way to do this is to decrease the silver ions in solution. This is done by decreasing the silver present and increasing the free cyanide. Such a bath is used only until the surface of the base metal is covered, the work then being transferred to the ordinary bath.

Such a preplating solution is called a strike and is very inefficient as a depositor of metal. In some cases two strikes are used. The formulas are given: Silver as cyanide (AgCN), 0.12 ounces per gallon (avoirdupois), with potassium cyanide (KCN), 9 ounces per gallon; or silver as cyanide (AgCN), 0.4 ounces per gallon (avoirdupois), with potassium cyanide (KCN), 9 ounces per gallon. Carbon anodes are employed, a small area of silver being used to replenish that deposited. Temperature of the bath should be 70 to 80 degrees Cent. Current density is 15 to 25 amperes per square foot, using a 6-volt drop across the bath.

It is possible to deposit a thin film of mercury on the base metal instead of using a strike. Such a solution contains: Mercuric chloride ($HgCl_2$), 1 ounce per gallon, with ammonium chloride (NH_4Cl), 5 ounces per gallon. Work, especially brass, dipped in this bath is covered with a layer of mercury which is lower in the electromotive series than the base metal.

There is some criticism to using mercury because of the possibility of poor adhesion. The author has in his files correspondence from Norman Plank of the General Electric Co., Pittsfield, Mass., which shows that mercury used as a flash prior to silver plating had not penetrated far enough into the structure to have any noticeable effect. An amalgamation of the mercury at the silver and brass interface took place but it was so slight as to be harmless. This was due to the affinity of silver for mercury and the small amount of mercury present.

A general paper on silver plating has been given by F. C. Mesle (3).

The question of adhesion will come up time and again in silver plating. The use of strikes is to prevent poor adhesion. A splendid article on this subject has been written by F. C. Mesle (4). On page 157 of this reference he points out that the best method on cold rolled steel consisted of using a copper strike on the steel and then following with a silver strike on the copper. Fair to good adhesion was obtained if a silver strike was used without any copper flash. Highly polished steel surfaces appeared to provide better adherence for deposits than did rough finished steel. Peeling of the deposit appeared arrested in poorly adherent silver strike deposits by heating to 350 degrees Fahr. for 10 minutes.

(Concluded in May 4 Issue)

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(1) "Defense Highlights", *Metal Finishing*, 40, No. 2, February, 1942, p. 68.
(2) "Something New in Silver Plating", by Donald Wood, *Monthly Review*, American Electroplaters' Society, March, 1938, pp. 171-179.
(3) "A Resume of Silver Plating", *Monthly Review*, American Electrical Society, October, 1937, pp. 739-759.
(4) "The Adhesion of Electro-Deposits", *Proceedings of the American Electrical Society*, June, 1939, pp. 152-170.

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Develops Two New Hard-Facing Alloys

To serve companies unable to furnish high priority ratings for chromium alloys, Stoody Co., Whittier, Calif., is marketing under the trade names of Stoodite K and Self-Hardening K, two newly developed hard-facing alloys. These are said to contain no chromium and can be purchased under the regular A-10 P-100 rating.

Extensive field tests, according to the manufacturer, proved the rods comparable to regular alloys in application and wear resistance.

High-Iron Charges

(*Continued from Page* 90)

denly blow, and chill, and then require a "pick-up" to get them out.

The reaction between pig iron and cold ore is endothermic, sufficiently so to sometimes freeze up the bath, regardless of the silicon in the iron. If the ore is heated, the reaction is exothermic, thus helping to melt the scrap and speed the time of heats.

In Australia the ore is a red hematite, containing about 50 per cent lumps over 1 inch and 3 per cent moisture. The fines, if charged, are sufficient to cause frequent blows. In wet weather it is unusable for a satisfactory or safe operation. The open-hearth ore, therefore, is screened over a grizzley to remove the fines under 1 inch.

Hard Sinter the Answer

The logical solution to the problem in the United States, where the ores are both fine and wet, is obviously to make a hard sinter for open-hearth charging. Nodules also should be satisfactory where available. The porosity of sinter, however, would allow it to heat more readily and so shorten the necessary interval between charging the cold material and adding the hot metal.

The necessity is for a pile of ore which can be heated through rapidly. Whether this is lump ore, sinter, nodules, or some other form, does not make any difference as long as this condition is met. That form of ore which can be heated most rapidly is the most satisfactory.

The average run-off slags in Australia analyze:

SiO_2 — 23.3	Al_2O_3 — 3.9	MgO — 3.3
FeO — 25.2	MnO — 20.8	P_2O_5 — 0.8
Fe_2O_3 — 7.8	CaO — 15.7	

About eight years ago, in England, steelmakers were confronted with the problem of charging 70 per cent hot metal containing 1.70 per cent phosphorus. The stationary furnaces were 65 and 125 gross tons capacity. The established practice was to try to keep the silicon in the iron about 0.40 per cent and then, in an "active" mixer, reduce it to 0.20 per cent. No run-off slags were used in the open hearth and a slag volume of about 35 per cent was necessary for removing the phosphorus.

An "active" mixer is a large tilting open-hearth furnace with insufficient checkers. Ore and lime are added to reduce the silicon and phosphorus. Little, if any, phosphorus is removed, and the silicon can be reduced to 0.20 per cent if time is allowed between the charging of hot metal and taking metal out for the furnaces. As this interval is not controllable, the effectiveness of the mixer is variable.

A typical slag from an active mixer shows how little phosphorus is removed:

SiO_2	— 36.21	CaO	— 32.08
FeO	— 5.12	MgO	— 18.12
Fe_2O_3	— 0.28	P_2O_5	— 0.18
MnO	— 5.12	Al_2O_3	— 0.88
S	— 0.10	TiO_2	— 1.65

To try to operate the blast furnaces on 0.40 per cent silicon iron causes frequent disturbances of the furnaces and a considerable number of cold casts. In these cases no additions can be made to the mixer until the iron temperature is raised. This is a slow proceeding with dead metal.

A "run-off" slag procedure was started along the lines developed in Australia. Good lump ore was not regularly available. Swedish ore was tried. This ore, while dry, contained about 75 per cent fines and was unsatisfactory as it could not be heated, and caused "blows". The best ore was from occasional cargoes from Brazil. While Brazilian ore is excellent for open-hearth operations the supply cannot be depended upon.

Finally, sinter made from Swedish ore, mill scale, and some local ore was charged and this gave excellent results. The "run-off" slags

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by Mercury

In this unit constructed drive axle assembly

Here's the drive that's really tough! Motor and Drive are a single unit assembly, fully inclosed . . . reduces strain, simplifies construction ● Double Reduction Spiral Bevel and Spur Gears transmit the maximum power with minimum wear. Semi-elliptic Spring Suspension provides smooth riding, reduces shock ● Brakes are in the wheels for greatest safety ● Standardization of Parts and Easy Accessibility reduce maintenance time to the minimum.

For the complete story on the Mercury Drive Assembly and Mercury Material Handling Equipment write for Bulletin 201-5.

Mercury Pioneered and Perfected These Lift Truck Improvements:

The Hydraulic Lift
Snap Action Cam Operated Controller
Single Unit Double Reduction Drive Axle Assembly
All Welded Frame
Special Trail Axle Design

MERCURY MANUFACTURING COMPANY 4140 S. Halsted St., Chicago, Ill.

TRACTORS · TRAILERS · LIFT TRUCKS

contained 18 to 25 per cent P_2O_5 and removed over 90 per cent of the phosphorus and all of the silicon.

After having found a satisfactory substitute for natural ores, the active mixer was no longer operated as an "active" mixer and the silicon in the iron was allowed to go to 0.90 to 1.10 per cent and at times went as high as 1.70 per cent silicon. At about 1.00 per cent silicon the blast furnaces produced their maximum tonnage.

As a matter of interest only, it is customary to sell these high P_2O_5 slags for fertilizer. Unless the CaO content of the slags is at least 1.57 times the P_2O_5, the phosphate in the slag is insoluble in citric acid and therefore is unsalable.

In these run-off slags, the ratio of CaO to P_2O_5 is normally less than this. In order to try to remedy it, sinter made from Lincolnshire ore which contains about 25 per cent lime, was tried. By sandwiching this sinter in the scrap charge, a salable slag was produced. However, it slowed up the heats, made the run-off slags less complete by thickening them and therefore removed less of the phosphorus, and did not become a regular proceeding.

Typical run-off slag analyses are presented in Table I. Iron analyses are as follows:

	Si	P	Mn
H-591	0.84	1.73	1.45
H-469	0.92	1.61	1.54
G-345	1.07	1.65	1.42
G-275	1.14	1.80	1.37

The best silicon to have in the iron is that which permits the blast furnaces to turn out the greatest tonnage. The open hearth can handle equally well any reasonable silicon provided it is known before the ore is charged. As a higher silicon in the iron requires more ore in the charge, more metallic charge can be secured from the same weight of iron and scrap with the higher silicons.

The method of arriving at a basis for calculating the amount of ore to charge is a little involved, but after a number of factors have been determined, a simple table will do very well for the daily operations.

Example: Determine the percentage of hot metal of 1.00 per cent silicon necessary to melt down the various grades of scrap without any ore charge. Suppose this turned out to be:

Heavy melting scrap 60—Hot-metal 40
Light clean scrap 50—Hot-metal 50
Light rusty scrap 40—Hot-metal 60

Assume the scrap charge is 10 tons of each grade for a 100-ton heat, using 70 tons of hot metal of 1.00 per cent silicon.

10 tons heavy melting require 6.7 hot-metal
10 tons medium require 10.0 hot-metal
10 tons light rusty require 15.0 hot-metal
30 tons scrap require 31.7 hot-metal

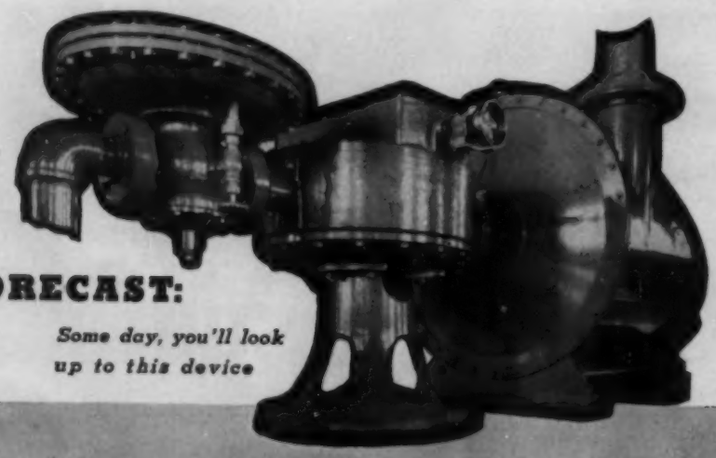
The 70 tons of hot metal gives an excess of hot-metal of 38.3 tons. It has been determined that it takes 0.30-ton of ore for an excess ton of 1.00 per cent silicon iron, so the ore requirement is 11.5 tons.

Another factor to determine is the melting down value of irons of different silicon contents. The equivalent melting value of different silicon irons compared to 1.00 per cent silicon is:

Silicon	Required for 1% Equivalent	Silicon	Required for 1% Equivalent
.40	1.30	.90	1.05
.50	1.25	1.00	1.00
.60	1.20	1.10	.95
.70	1.15	1.20	.90
.80	1.10	1.30	.85

Going back to the assumed charge with the silicon in the iron 0.80, the iron required to melt the 30 tons of scrap would be 31.7 × 1.10 or 34.9. The excess iron of 0.80 silicon would be 35.1. To reduce this excess to the equivalent of 1 per cent silicon, divide by 1.10 = 31.9. The ore required is 0.30 × 31.9 or 9.6 tons.

Assume the silicon in the iron is



FORECAST:

Some day, you'll look up to this device

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This is the patented, exclusive Kemp Industrial Carburetor, the machine that provides *complete* premixing of gas and air to provide new savings, new heat liberation, new flexibility and new control in almost every type of ferrous and non ferrous heat processing.

As the basic unit in Kemp heat treating the Industrial Carburetor supports gas immersion melting in modern tin stacks, provides fuel for inert gas and for recirculating radiators in annealing covers, for Kemp Radiatube Roll Heaters, may be set for exactly the desired flame characteristics whether reducing, oxidizing or for complete combustion . . . and save 15 to 40 percent in fuel. For engineering details and assistance, address **The C. M. Kemp Manufacturing Company, 405 East Oliver Street, Baltimore, Maryland**

KEMP of BALTIMORE

1.30 per cent. The 31.7 tons of hot metal necessary for the 30 tons of scrap using a factor of .85 would be 26.9. The excess of 1.30 per cent silicon iron would be 43.1 tons. The equivalent in terms of 1.00 per cent silicon would be 50.7, and the ore required 15.2 tons.

The summary for the silicon variation is:

0.80 Si— 9.6 tons ore
1.00 Si—11.5 tons ore
1.30 Si—15.2 tons ore

Allowances must be made, and ore reduced arbitrarily for slow furnaces, and after "gas-off" delays, high-carbon melts, etc.

Limestone percentage must be as low as possible. The reaction between the heated ore and the hot metal puts all of the silicon and phosphorus into the slag in a short time. This will flow from the furnace in the run-off slag. Regardless of the percentage of silicon in the hot metal, the resulting silica is removed from the furnace. After the run-off slag there is left only that part of the silica which is in the slag remaining in the furnace. This is nearly a constant. The amount of limestone to charge is only the amount necessary to take care of this remaining silica. As stated before, the Australian practice has averaged for years 5.5 per cent. It was for several months as low as 4 per cent, but there seemed to be an increase in bank trouble so that it was finally settled at the 5.5 per cent. This permits some variation in the time of adding hot metal.

If more limestone is used than necessary, the finishing slag is thick and slows the heat until the slag can be adjusted.

Burnt lime instead of limestone in the charge will, in part, combine with the run-off slag. This thickens the run-off and makes the flush less complete, and therefore more silica is left in the furnace than otherwise. As part of the lime has been used in the run-off slag, there is not sufficient left for the remaining silica, and banks are cut.

The limestone to charge is determined largely by the silica in the charge ore and not by the silicon or phosphorus or percentage of hot metal.

The analysis of the run-off slag varies considerably between heats, but there is a much greater variation in analysis between the beginning and the end of the run-off from any one heat.

Australian slags would not be comparable here because the hot metal averages 2.25 per cent manganese, and the charge ore contains 5 to 7 per cent manganese.

Finishing slags are consistent in analysis. We have worked out a method of making high phosphorus sheet bar and skelp using phosphate rock instead of ferrophosphorus. There is no ferrophosphorus manufactured there, and the war stopped its importation. Phosphate rock is charged, then 2 per cent of limestone, then the ore and scrap as usual. The reduction of phosphorus to the bath depends upon slag control, but in less than 10 per cent of the heats is any adjustment of the slag necessary to meet the specifications for phosphorus. Heats made in this manner constitute about 15 per cent of the total product.

Residual manganese also is regulated by slag control and half of the heats require no manganese addition.

To sum up, the essentials are:

1. Lump ore, or its equivalent, for charging.
2. The sequence of charging and the time factor.
3. Low limestone charge.
4. No burned lime charge.
5. Run-off slag completed before limestone enters reactions.

In plants of sufficiently large production the surplus iron could be duplexed, but the ingot production from the same tonnage of scrap and hot metal would be appreciably less. Table II shows as

DEFECTS
CUT TO LESS THAN 1%

Murex engineers are generally able to help manufacturers solve perplexing welding problems because of their wide and varied experience in many industries with the welding of many products under all kinds of actual working conditions.

Take, for instance, the case of the manufacturer of power boilers. In automatic welding, rejects were high and the chipping and rewelding excessive. The Murex representative made a few seemingly minor alterations in welding procedure, including changing the direction of the slot in the electrode coating to get better slag action.

The result? X-rays from then on showed defective portions to be less than 1%.

It is the obligation of the Metal & Thermit Corporation, through its engineering department, to help manufacturers engaged in war production speed up their welding —whether or not they are Murex users.

Write or phone our nearest office.

Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.

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120 BROADWAY, NEW YORK, N.Y.
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MUREX
ARC WELDING ELECTRODES

an example how much metallic charge is gained from the iron in the ore, when high-iron charges are used, and also what weights of ingots is obtained for 1 ton of pig and scrap. The tonnage will be less when scrap lighter than heavy melting is used.

While at this time production cost is secondary to output, it is a consideration that iron from the ore is the cheapest source of open-hearth charging material.

The accompanying graph shows the amount of ore to be charged for varying percentages of hot-metal in the charge, the silicon content of the hot metal, and for different grades of scrap.

These are the actual operating figures for the Newcastle, Australia, open-hearth furnaces. They do not necessarily apply to any other plant. Furnace design, fuel, depth of bath, and especially the nature of the ore and hot metal alter the quantities. They could, however, be used as a guide where the procedure is substantially the same.

Canadian Trade Directory

Canadian Trade Index, 1942; cloth, 842 pages, 6½ x 10 inches; published by Canadian Manufacturers Association, Toronto, Ont., for $6.

This is an authoritative source of reference on what is made in Canada and who makes it. Under war conditions this information is of more value than ever, as much material formerly imported has been cut off and sources in Canada are sought. As a matter of policy, arsenals and government-owned plants are not listed.

Names, addresses and specifications have been thoroughly revised. Hon. James A. MacKinnon, minister of trade and commerce, has supplied a foreword to the export section.

The usual five sections have been included, the first being a special export section; Part II is an alphabetical list of manufacturers, with addresses, branches, export representatives, trade marks, brands, etc.; Part III is a directory of Canadian manufacturers classified according to products, with a guide to the classified index; Part IV is a directory of producers, shippers and exporters of agricultural products and allied lines; Part V is an alphabetical list in French of the headings in Part III, with parallel English.

Canadian manufacturers are listed without regard to membership in the association.

Motor "Selector" Aids Plant Electricians

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is offering through its district offices and distributers a pocket size "slide rule" selector to guide electricians, plant maintenance men and others in the selection of the proper type motor for each of 44 industrial applications. It also features a convenient table that lists the various uses and indicates which of the four principle types of alternating-current motor should be selected.

Specifications, performance ratings and control classes for the required type is readily determined by making the corresponding setting on the slide. The reverse side of the "rule" shows which of the various magnetic and manual controls are available for each motor and lists the proper control number.

Don't Abuse Rubber

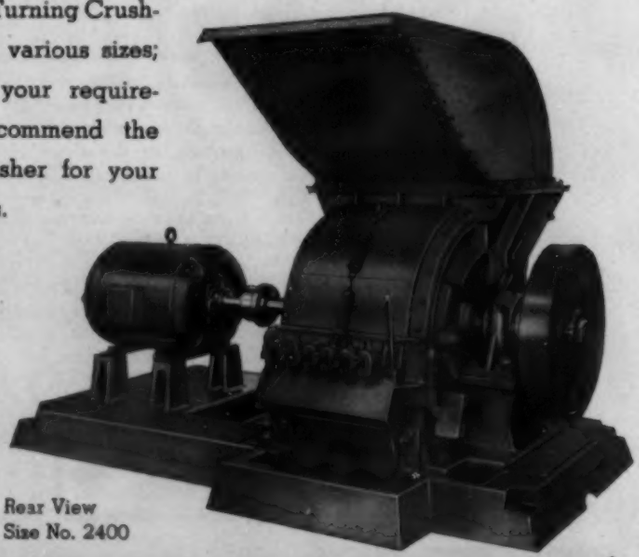
Mimeographed reprints of the text of an article on the subject "Don't Abuse Rubber—How To Prolong Its Life" are now available upon request from B. F. Goodrich Co., Akron, O. The article, which appeared in several trade journals, was written to aid industrial managers in their efforts to save rubber products in view of the present shortage.

then it's time to investigate the

AMERICAN RING TURNINGS CRUSHER

Chips, borings and turnings can be a terrific nuisance in any shop where automatic screw machines, lathes and planers, etc., pile up daily heaps of metal refuse. This waste byproduct is too valuable to throw away and too bulky to store. The problem is solved by the American Ring Turnings Crusher. This crusher utilizes the famous rolling ring principle of crushing, quickly and economically reducing bulky turnings of low or high carbon steel, alloy steel or brass into "Chips". American Ring Turning Crushers are built in various sizes; we will study your requirements, and recommend the proper size crusher for your particular needs.

ORIGINATORS OF THE ROLLING RING CRUSHING PRINCIPLE



Rear View
Size No. 2400

AMERICAN PULVERIZER COMPANY
1539 MACKLIND AVE. ST. LOUIS, MISSOURI

For Your Billet and Bar Mills

Other Mackintosh-Hemphill Products:	Heat treatment of Billet and Bar Mill rolls, to provide that they give excellent
Rolling Machinery	
Shape Straighteners	service, is of utmost importance, as every mill operator knows. Here at Mackintosh-
Strip Coilers	
Shears	Hemphill we have the most modern equipment and the heat treatment phase of
Levellers	
Pinions	our roll manufacture receives its proper attention. And "Techni" Process, developed
Special Equipment	
Iron-Steel Castings	exclusively by Mackintosh-Hemphill, in combination with proper heat treatment,
The NEW Abramsen Straightener	
Improved Johnston Patented Corrugated	has gained a wide approval of our rolls wherever steel is rolled.
Cinder Pots and Supports	*Since 1803—Pioneers, Engineers and Builders*
Heavy Duty Engine Lathes	MACKINTOSH-HEMPHILL COMPANY . . . . Pittsburgh and Midland, Pennsylvania

USE

"Techni"

PROCESS STEEL
OR ALLOY STEEL ROLLS

The Rolls with The Red Wabblers
They Roll More Tons Per Dressing

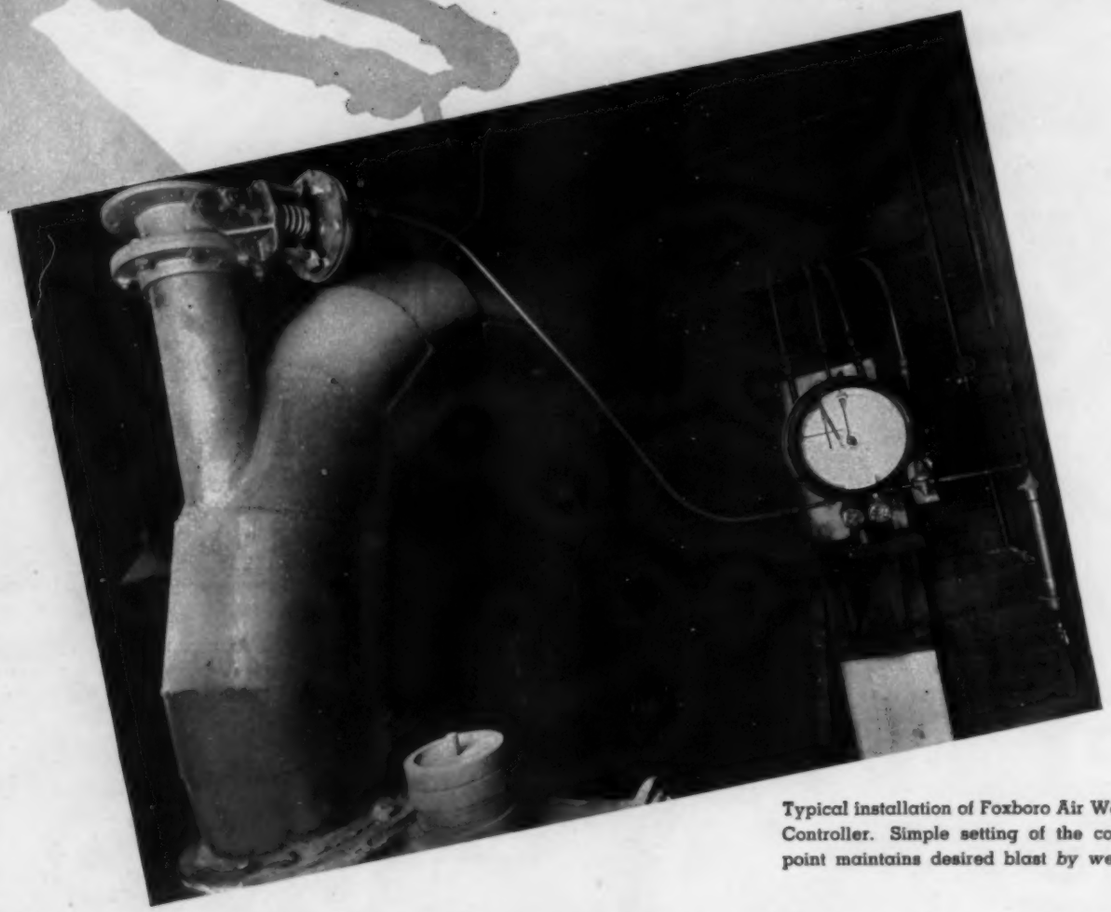
higher quality finish

increased production

lower cost per ton

This "Phantom Foundryman"

INCREASES FOUNDRY OUTPUT!



Typical installation of Foxboro Air Weight Controller. Simple setting of the control point maintains desired blast *by weight.*

Easily-installed Foxboro Controller keeps heats uniform and hotter . . . eliminates pigging and rejects

A simple installation makes any cupola produce added tonnage of good castings per day. All that is needed is Foxboro Air Weight Control equipment on the blast line!

This "phantom foundryman" automatically controls the blast to supply a constant *weight* of air per minute, regardless of wind-box pressure, atmospheric temperature or barometric pressure. It makes *every* day a "good pouring day"!

You'll get consistently better melting . . . hotter heats without burning . . . uniform pouring conditions that prevent faulty castings and eliminate need for pigging.

Write for Bulletin B-268 on Foxboro Air Weight Controllers, or detailed information on other Foxboro Instruments for metal industries. The "Phantom Foundryman" is only one example of Foxboro's Creative Instrumentation that can boost output, cut costs and save maintenance in wartime plants. **The Foxboro Company, 118 Neponset Ave., Foxboro, Massachusetts, U. S. A.** Branch offices in principal cities of the United States and Canada.

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FOXBORO
REG. U. S. PAT. OFF.
Instrumentation

Fin-Tube Development Saving Much Metal

Development of fin-tubes in heat exchanger equipment saves an appreciable amount of metals originally required for tube construction, declared A. Y. Gunter, development director, Alco Products Division, American Locomotive Co., New York, in a paper delivered before the midyear meeting of the American Society of Mechanical Engineers, at the Rice hotel, Houston, Texas, recently.

Gunter estimated the saving effected by this type of equipment in many cases may be as much as 40 per cent.

Use of fin-tubes, where applicable, in place of bare tubes in heat exchangers makes a saving of from 65 to 75 per cent in the number of tubes required, he pointed out. Oil exchangers containing the fin-tube construction are being used importantly in Navy shore bases and on destroyers, cruisers and other warships, as well as in the oil industry throughout the country, according to Gunter.

Develops Blackening Process for Copper

A new process called Ebonol C for direct, low temperature, chemical blackening of copper and copper alloys is reported by Enthone Co., 442 Elm street, New Haven, Conn. It involves immersion of products in a solution of blackening salts operated near the boiling point.

Besides regular copper, the process is stated to be suitable for blackening beryllium copper, bronze, phosphor bronze and brasses with zinc contents of 35 per cent or less. The coating imparted is essentially cupric oxide, and being integral with the base metal, it cannot chip or flake. It also is suitable for parts that must withstand close dimensional tolerances, parts that will be handled to a large extent and for parts that must be deformed without the coating flaking.

Unusual feature of the finish produced is it can be heated to almost dull red without flaking. Finishes can be applied in about 2 to 10 minutes, according to the company.

Proposed Practice for Boilers To Save Metals

Elimination of 112 varieties of range boilers and 6 varieties of expansion tanks is proposed in a simplification program recently submitted to industry by the Division of Simplified Practice, National Bureau of Standards, Washington, at the request of the War Production Board.

The 24 varieties of range boilers and 5 varieties of expansion tanks recommended for retention are considered adequate for consumer needs during the emergency, it is said.

Recommendation's purpose is to conserve material and release facilities needed for war production. Following any adjustment deemed necessary, the recommendation will be issued as an emergency revision of simplified practice R8-29, "Range Boilers and Expansion Tanks".

In view of the fact that WPB may decide to issue a limitation order covering this recommendation, manufacturers who have not already received a copy of the proposed action are urged to write immediately for a copy.

Develops Substitute

Sublan, a lanolin substitute recently introduced by Glyco Products Co. Inc., 230 King street, Brooklyn, N. Y., because of its water insolubility, can be used for a number of industrial purposes. It can be utilized as a seal in lines carrying water and as a protective coating for metals and as a lubricant.

The product is a light colored paste with a melting point of 55 to 60 degrees Cent.

WHEN MACHINING BULLET CORES...

...the selection of the right cutting fluid first will save time, tools and scrap!

• The experience of the pioneer manufacturers now using skillfully developed applications of

Stuart's Thred Kut

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is available, upon request, to new prime or sub-contractors just starting.

For All Cutting Fluid Problems

D. A. STUART OIL CO.

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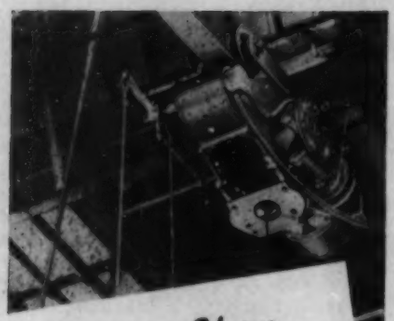
Warehouses in All Principal Metal Working Centers



Success Story

IN 78 WORDS!

The Place: A plant producing heavy and fine chemicals.

The Problem: Lifting heavy drums of chemicals to a raised vat. When done with block and tackle, three men were needed to provide the proper lift speed. That took men away from nearby jobs and slowed production.

The Solution: This ½-ton Reading Electric Hoist paid for itself within two months—by keeping two men on their regular jobs 100% of the time and letting the third raise drums alone—in half the previous time.

• Remember that when results and savings are in your specifications, it pays to rely on Reading's engineering ability.

READING CHAIN & BLOCK CORP.
DEPT. D-4 READING, PA.

READING
Chain Hoists, Electric Hoists, Cranes and Monorails

APPLIED PSYCHOLOGY

. . . . increases war output 20 times, using same operators, same equipment

OUTPUT of shell fuze cases in a British munitions factory increased 20-fold after the improvements suggested by industrial psychologists had been adopted. The work involved careful hand-soldering of seams. As the plant had lost most of its experienced solderers, the weekly output was only 1000 good cases, with several thousand rejects. But various changes were made, the most important of which was a systematic training scheme based on careful study of hand and body movements. The result was to raise the output to 20,000 cases a week, all passed by the inspectors.

This is only one of the cases in which trained psychologists from Britain's National Institute of Industrial Psychology have helped to speed up production in Britain's war factories. Although the results are sometimes startling, there is no particular magic about their job for it is based on a careful study of the physical movements entailed, on proper methods of instruction, and above all on interesting the trainee in the work.

Hours of wasted time have been saved merely by getting the trainees into the habit of arranging their tools around them in an orderly way and replacing them in that position after each use. More subtle are devices whereby both hands can be used instead of one. For example, suppose a screw has to be placed on either end of an article. Instead of holding it in one hand and then transferring it to the other, it is held in a vise so both screws can be put on simultaneously. Then to save the trouble of picking up the completed piece, a foot pedal may come into operation and drop it into a box.

Training is made interesting by interspersing handwork with general instruction so that trainees understand how their work fits into the general scheme. In weaving, for example, they are told about the types of thread employed, the use of the cloth which is being woven,

Fourteen-Foot Hand Lift Truck

ALTHOUGH LOADED with seventeen men, the vehicle shown above is not a new scooter type truck for intraplant commuters. It is a special adaptation of the Load King hydraulic hand lift truck made by Yale & Towne Mfg. Co., Philadelphia, for handling long objects such as wall board and roofing. The truck is 168 inches long

and so on. In tank factories they not only see their particular part assembled into the completed job, but are shown the tank in action.

Coil winding operatives trained by these methods were found to reach a standard of proficiency in only 5 days which previously had taken 5 weeks. Moreover, this was not achieved at the expense of output, for a 65 per cent increase in the average output of good pieces was obtained, while the scrap rate fell from 5 to 2 per cent.

Apart from this, the psychologists have increased production by suggesting improvement in working conditions, amenities and by investigating and smoothing grievances.

Offers Engineers Time-Saving Device

Alco Products Division, American Locomotive Co., 30 Church street, New York, is offering a limited number of mean temperature difference calculators devised to aid engineers in the approximation of heat transfer surfaces when preparing estimates or specifications for heat exchanger equipment.

Available for 25 cents, the calculator includes scales for the calculation of the logarithmic M. T. D., as well as the M. T. D. correction factors for 1, 2, 3, 4 and 6 shell passes, and also C and D scales which permit multiplication and division operations.

Watthour Meter Controls Electroplating Current

A new use for the ordinary watthour meter is reported by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. It has been found to provide an accurate and refined control of current used in electroplating permanent magnets.

The meter in this application is connected to the alternating current side of a rectifier such as used to supply direct current for electroplating. The register for the meter includes a switch device adapted for closure after a predetermined amount of energy has passed through the meter. This switch operates a circuit breaker to open the energizing current circuit thereby interrupting the plating or charging circuit when desired plating thickness is attained. The meter also may be placed on a switchboard some distance away from the plating tank, according to the company.

Textbook on Gaging Is Announced by Sheffield

Recognizing the urgent need for technical literature dealing authoritatively with factors of vital importance in the war production program, Sheffield Corp., Dayton, O., has brought out a basic textbook on gaging.

This 7¾ x 10¾-inch volume has 64 pages with 82 illustrations and is durably bound in cloth with still covers. Entitled "Dimensional Control," it deals in a clear, to-the-point manner with various types of modern precision gages and their practical application in manufacture and inspection.

Review of chapter headings indicates clearly the scope of this book. They are: History of Standards and Gaging; Science of Measurement in Modern Industry; Fixed Size Gages; Tolerances; Go and No Go Gages; Thread Snap Gages; Assembly Practices and Non-Perishable Gages; Visual Gages; Electric Gages; Multiple Gages; Air Gages; Thread Lead Measurement; External Measurement; Internal Measurement; Future of Precision Manufacture; Fits and Tolerances.

"Dimensional Control" is being sold in the open market at $1.50 per copy, or can be obtained at that price by writing direct to the company.

DEARBORN GAGE COMPANY
Originators of Chromium Plated Gage Blocks
22036 BEECH STREET · · DEARBORN, MICHIGAN

NAMCO CIRCULAR CHASER DIES "PAY OUT ON SHORT RUNS TOO"

The J. F. Patton Machine and Mfg. Co., Cleveland, is a modern job shop with a steady flow of high grade machining operations.

In its threading department some jobs run into large quantities, others a few thousand, some as low as 500 pieces on one set-up.

Mr. J. F. Patton, President, says, "Namco Circular Chaser Dies pay out on the *short* runs too."

This Company, like many others, is equipped with a complete range of Namco die heads and carries extra sets of circular chasers in diameters and pitches needed for a wide variety of threading.

By the use of the micrometer gage, they check and regrind the extra chasers in the tool room. One adjustment of the head brings all chasers to exact cutting size.

So, on new set-ups for short runs as well as regrinds for production jobs, circular chasers are ready to go without fussing. Down time is saved and scrap avoided.

And don't forget—circular chasers give 20 times more life than old types—you can grind to 270° of their circumference.

Whether your threading jobs run to millions, thousands or hundreds of pieces of a kind, it will pay you to find out how much time and cost Namco Circular Chaser Dies will save and earn.

THE NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • SOLENOIDS • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

War and Lease-Lend Steel Crowd Mills

Latter given preference over priorities. Delivery promises now only on A ratings. Scrap gain holds. Ice delays ore vessels

MARKET IN TABLOID ★

Demand

War needs absorb output.

Prices

Slight adjustments by OPA.

Production

Unchanged at 98½ per cent.

DELIVERY promise on steel below A-1 priority is virtually impossible to obtain under present circumstances and early delivery requires priority well up in this classification.

A large producer reports ratings necessary for reasonable delivery range about as follows: Plates, A-1-a; structurals, A-1-b; sheets, A-1-f; reinforcing bars, A-1-k; tiling, A-1-b; carbon bars, A-1-a to A-1-k; all alloy steels, A-1-a; semifinished steel, A-1-j; railroad items, completely directive.

With this congestion in the upper brackets a large lease-lend tonnage has been distributed widely among producers of a large variety of products, with instructions to place it ahead of all previous priority ratings. This has resulted in disruption of rolling schedules and delay in rolling orders already scheduled. Some of the new tonnage is in highly finished products, thus carrying through many processes.

Concentration of steel consumption in war work, reflecting conversion of civilian facilities to essential production, is largely responsible for the large proportion of orders bearing high rating. Practically no requests now are received by mills for material on low priority, cessation of manufacture of a large number of durable consumer goods cutting them to a minimum.

Steelworks operations remained steady at 98½ per cent last week. Chicago advanced 1 point to 105 per cent of rated capacity, an all-time record, ½-point above the previous mark set in December and reached again the first week in April. Eastern Pennsylvania mills received better scrap supply and advanced 2 points to 94 per cent. New England producers completed open-hearth repair and all furnaces were in production, with a rate of 100 per cent. Pittsburgh declined 1 point to 95½ per cent, Detroit 2 points to 90 per cent, St. Louis 2½ points to 90½, Cincinnati 4½ points to 91½, Buffalo 3 points to 90½ and Cleveland 1 point to 89½. Youngstown held at 92 per cent, unchanged, with a rise to 94 per cent predicted for this week. Birmingham was unchanged at 95 per cent and Wheeling at 82½ per cent.

Difficulty in obtaining structural steel without long delay is causing numerous projects to be redesigned for reinforced concrete and timber construction. The latter offers best results as reinforcing bars also are difficult to obtain without considerable delay and require a high priority rating. Some projects for which timber construction is not feasible are being abandoned or deferred until conditions are better.

Scrap supply is keeping up the improvement of the past few weeks but increased consumption is preventing accumulation in reserves. Not all areas are receiving sufficient material and some open hearths continue idle. Efforts to bring out dormant material are continued without slackening, adding much to the normal output. Some observers hold the hope that collections during the summer will be sufficient to build some stocks for next winter. Movement from the head of the lakes has started in a small way and promises to increase.

Iron ore movement is hampered by ice in Lake Superior at the entrance to the Soo locks, a large number of loaded vessels being held back many hours before they can be locked through. At one time last week 80 ships were waiting their turn. That so large a number had been loaded and had started their trips indicates the volume that will be moved when ice difficulties cease.

Pig iron producers have been given relief by OPA from the necessity of absorbing increased transportation costs involved in shipments under allocation to points outside their usual market areas. A new ruling permits producers in case of such shipments, due to emergency conditions, to charge the basing point price, plus differentials established in the schedules and freight charge from basing to delivery point, with deduction of $1 per gross ton.

Requests for pig iron allocations under priorities below the A classifications have practically disappeared, consumers being increasingly engaged in production of war work.

Office of Price Administration has opened the door for applications for relief from the $6 ceiling on beehive fuel. The producer must show that net realization is insufficient to support continued operation at the maximum price.

Composite prices continue unchanged under ceiling regulations, finished steel at $56.73, semifinished steel at $36.00, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Apr. 18	Apr. 11	Apr. 4	One Month Ago Mar., 1942	Three Months Ago Jan., 1942	One Year Ago Apr., 1941	Five Years Ago Apr., 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$61.95
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.84
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	21.27

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails ,tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	April 18, 1942	Mar. 1942	Jan. 1942	Apr. 1941
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.48	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.217	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.215	2.15	2.21
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	April 18, 1942	Mar. 1942	Jan. 1942	Apr. 1941
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.365	25.34	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.22	24.22	24.22
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	24.06
No. 2X, del. Phila. (differ. av.)	26.215	26.24	26.215	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.44	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	125.63	125.39	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.20
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.00
Heavy melting steel, Chicago	18.75	18.75	18.75	18.80
Rails for rolling, Chicago	22.25	22.25	22.25	22.65
No. 1 cast, Chicago	20.00	20.00	20.00	22.31

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$5.50
Connellsville, foundry, ovens	7.25	7.25	7.25	6.00
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.85

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to invidividual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.00; Duluth (bil.) $36.00.

(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.00; Duluth, $42.00.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.

Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.25. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.25c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.50c, all-rail 2.59c Pac. ports, dock 2.50c; all rail 3.25c.

(Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Josiyn Mfg. Co. may quote 2.35c, Chicago base.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c Detroit 2.80c.

S.A.E.	Alloy Diff.	S.A.E.		Alloy Diff.
2000	0.35	5100	Spr. flats	0.15
2100	0.75	5100	80-1.10 Cr.	0.45
2300	1.70	6100	Bars	1.20
2500	2.55	6100	Spr. flats	0.85
3100	0.70	Carb., Van.		0.85
3200	1.35	9200	Spr. flats	0.15
3300	3.80	9200	Spr. rounds, squares	0.40
3400	3.20			
4100 .15-25 Mo.	0.55	T 1300, Mn, mean 1.51-2.00		0.10
46.00 .20-.30 Mo.				
1.50-2.00; Ni.	1.20	Do., carbon under 0.20 max.		0.35

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit 3.45c; Galveston, add $0.25, Pacific Coast $0.50.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.70c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Gulf ports, dock 2.50c, all-rail 2.59c; Pacific ports, dock 2.80c, all-rail 3.25c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.25c; Gulf ports, dock 2.50c, all-rail 2.59c; Pacific ports, dock 2.80c, all-rail 3.25c.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.20c; Phila. del. 2.28c; New York del., 2.35c Pacific ports 2.65c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; New York del. 3.41c; Phila. del. 3.39c; Pacific ports, 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c Phila. del. 3.68c; Pacific ports 4.05c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary,

Cleveland, Youngstown, Middletown, 10 gage, base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)
Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Worcester base 3.00c.
Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.
Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.
Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.
Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.
Manufacturing Ternes: Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
Roofing Ternes: Pittsburgh base per package 112 sheets, 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c.
(Central Iron & Steel Co. may quote carbon steel plates at 2.35c at established basing points; Granite City Steel Co. may quote ship plates 2.25c, f.o.b. mill.)
Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.70c; Pacific ports, 4.00c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.
Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c Phila., del., 2.22c; Gulf ports, 2.45c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points.)
Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c
Wire Products to the Trade:	
Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	67
Do., 11 gage and heavier	70
Barbed wire, 80-rod spool, col.	70
Twisted barbless wire, col.	70
Single loop bale ties, col.	59
Fence posts, carloads, col.	69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	⅝	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.
High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	..	67.00c
18.00	4	2	1	77.00c
18.00	4	3	1	87.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.
Extras mean additions or deductions from base prices in effect April 16, 1941.
Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.
Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin of shipment.
Dislocated tonnage: Producers shipping material outside their usual marketing areas because of the war emergency may charge the basing point price nearest place of production plus actual cost of transportation to destination.
Seconds or off-grade iron or steel products cannot be sold at delivered prices exceeding those applying to material of prime quality.
Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941. Domestic or export extras may be used in case of Lease-Lend tonnage.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine	
½ x 6 and smaller	65½ off
Do., ⅞ and ⅝ x 6-in. and shorter	63½ off
Do., ⅝ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	39 off
Tire bolts	50 off
Stove Bolts	
In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.	
Step bolts	58 off
Plow bolts	65 off

Nuts	U.S.S.	S.A.E.
Semifinished hex.		
½-inch and less	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws	
Upset 1-in., smaller	60 off
Square Head Set Screws	
Upset, 1-in., smaller	66 off
Headless, ¼-in., larger	55 off
No. 10, smaller	60 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens	
Connellsville, furnace	$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.90
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	13.50
Detroit, delivered	13.25
Philadelphia, delivered	12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do. less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls. to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$20.00

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65	.....	.....	28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	.	.
Baltimore, del.	25.67	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	†24.47	.....	.....	.....
Cincinnati, del.	24.30	22.92	.....	.....
Cleveland, del.	24.12	23.24	.	.
Newark, N. J., del	26.24	.....	.....	.....
Philadelphia, del.	25.51	25.01	.....	.....
St. Louis, del.	†24.12	23.24	.	.
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	.....	.....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	.....	25.00	24.50
St. Paul, del.	26.76	.....	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.68	24.68	.	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
‡Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	.....	.	.
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.	.....
Baltimore, del.	26.05	.....	.....	.....
Steelton, Pa., base	.	24.50	.	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	.....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorous 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton. Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$28.00
Chicago, del.	31.54

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable.

Export Prices: In case of exports only, the governing basing point nearest point of production may be used, plus differentials and export transportation charges.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.69

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama; Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	38.00
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide, net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00
Do., barge	25.00
No. 2 lump	25.00

Ferroalloy Prices

Ferromanganese, 78-82%,

Carlots, duty pd., seab'd	$120.00
Carlots, del. Pittsburgh	125.63
Carlots, f.o.b. So. f'ces.	140.00

Add $10 for ton, $13.50 for less ton, $18 for less than 200-lb. lots.

Spiegeleisen, 19-21%, gross ton, Palmerton $36.00

Manganese Briquets, Contract carloads, bulk freight allowed, per lb.

Packed	5.50c
Ton lots	5.75c
Less-ton lots	6.00c
Less 200-lb. lots	6.25c
Spot ¼c higher.	6.50c

Manganese Electro, 99.9+%, less car lots 42.00c

Chromium Metal, per lb. contained chromium

	Contract	Spot
98% Cr. ton lots	80.00c	85.00c
88% Cr. ton lots	79.00c	84.00c

Ferrocolumbium, 50-60% f.o.b. Niagara Falls, per lb. contained Cb on contract $2.25

Less-ton lots	2.30
(Spot 10c higher)	

Chromium Briquets, per lb., freight allowed

	Contract	Spot
Carlots	8.25c	8.50c
Packed	8.50c	8.75c
Ton lots	8.75c	9.00c
Less-ton lots	9.00c	9.25c
Less 200 lbs.	9.25c	9.50c

Ferrochrome, 66-70%, freight allowed, 4-6% carbon, per pound contained (chrome)

Carloads	13.00c
Ton lots	13.75c
Less-ton lots	14.00c
Less than 200-lb. lots	14.25c

67-72%, low carbon, cts. per pound:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50	20.25	20.75	21.00
1% C.	20.50	21.25	21.75	22.00
0.20% C.	21.50	22.25	22.75	23.00
0.10% C.	22.50	23.25	23.75	24.00

Spot is ¼c higher.

Ferromolybdenum, 55-75%, per lb. contained molybdenum, f.o.b. furnace 95.00c

Calcium Molybdate (Molyte), 40-45% Mo., per lb. contracts, f.o.b. producers plant 80.00c

Molybdic Oxide Briquets, 48-52% Mo. per lb. contained, f.o.b. producers plant 30.00c

Molybdenum Oxide, (In 5 and 20 lb. mo. contained cans) 53-63 mo. per lb. contained f.o.b. producers' plants 80.00c

Molybdenum Powder, 99%, f.o.b. York, Pa., per lb. in 200-lb. kegs $2.60

Do., 100-200 lb. lots	2.75
Do., under 100-lb. lots	3.00

Ferrophosphorus, .17-19%, gross ton carloads, f.o.b. sellers' works, $3 unitage, freight equalized with Rockdale, Tenn. for 18% phos.

Contract	$58.50
Spot	62.25

23-26%, $3 unitage, freight equalized with Mt. Pleasant, Tenn., for 24% phos.

Contract	75.00
Spot	80.00

Ferrosilicon, Gross tons, freight allowed, bulk

	Carloads	Ton lots
50%	$ 74.50	$87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

(Above for contracts; spot ¼c higher)

Silicon Metal, Spot ¼-cent higher (Per Lb., Contracts):

	1% Iron	2% Iron
Carlots	14.50c	13.00c
Ton lots	15.00c	13.50c
Less-ton lots	15.25c	13.75c
Less 200 lbs.	15.50c	14.00c

Silicon Briquets, Contract carloads, bulk freight allowed, per ton $74.50

Packed	80.50
Ton lots	84.50
Less-ton lots, per lb.	4.00c
Less 200-lb. lots	4.25c

Spot ¼c higher on less ton lots; $5 higher on ton lots and over.

Silicomanganese,

Carbon	1½%
Carloads (contract)	$128.00
Ton Lots (contract)	140.50

Freight allowed spot $5 above contract

Ferrotungsten. (All prices nominal) Carlots, per lb. contained tungsten $1.90

Tungsten Metal Powder, (Prices Nominal) 98-99 per cent, per pound, depending upon quantity $2.55-$2.65

Ferrotitanium, 40-45%, f.o.b. Niagara Falls, per lb. contained in ton lots $1.23

Less ton lots	1.25
20-25%, C. 0.10 max., in ton lots per lb. contained Ti	1.35
Less-ton lots	1.40

(Spot 5c higher)

Ferro-Carbon-Titanium, 15-20% Titanium,

	6-8% C	3-5% C
Carlots, contract, f.o.b. Niagara Falls, freight allowed to destinations east of Mississippi and north of Baltimore and St. Louis	$142.50	$157.50

Ferrovanadium, 35-40%, contract per pound contained vanadium $2.70-$2.80-$2.90

(Spot 10c higher)

Vanadium Pentoxide, Per lb. contained, contracts $1.10

Do., spot	1.15

Zirconium Alloy, 12-15%, carloads, contract, bulk $102.50

Packed	107.50
Ton lots	108.00
Less ton lots	112.50

Spot $5 a ton higher

35-40%, contract, carloads, bulk or package, per lb. alloy 14.00c

Do., ton lots	15.00c
Do., less-ton lots	16.00c

Spot is ¼-cent higher

Alsifer, Per lb., f.o.b. Niagara Falls.

	Contract	Spot
Carlots	7.50c	8.00c
Ton lots	8.00c	8.50c

Simanal, Per lb. of alloy, contracts, freight allowed (approx. 20% Si, 20% Mn, 20% Al)

Carlots	Ton Lots	Less Ton Lots
10.50c	11.00c	11.50c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Soft Bars	Hot-rolled Strip Bands	Hot-rolled Strip Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.68	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.04	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.42	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.92	3.45	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.39	4.23	4.98	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Chattanooga*	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	5.25	5.00	4.60	....	....
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	....	5.25	....	6.90	....	....
Seattle	4.20	4.25	5.45	4.75	4.45	6.50	4.65	7.00	5.70	....	5.75	....	....
Los Angeles	4.50	4.95	6.80	4.50	4.50	6.75	4.65	6.50	5.85	....	6.10	10.55	9.55
San Francisco	3.95	4.50	6.25	4.65	4.35	6.35	4.55	6.40	6.10	....	6.80	10.80	9.80

*Not named in OPA price order.

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	....	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	8.80
San Francisco	5.45	9.80	8.80	8.65	9.05

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£	s	d
Merchant bars, 3-inch and over	$66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.95c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£	s	d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6	8	0(a)
Basic pig iron	24.28	6	0	6(a)
Furnace coke, f.o.t. ovens	7.56	1	17	6
Billets, basic soft, 100-ton lots and over	49.37	12	5	0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10	6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12	0††
Shapes	2.77c	15	8	0††
Ship plates	2.91c	16	3	0††
Boiler plates	3.06c	17	0	6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15	0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2	6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15	0
Bands and strips, hot-rolled	3.30c	18	7	0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-10,000 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 500-999, Los Angeles, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

Gross ton c.i.f. Baltimore; dry basis; subject to penalties for guarantees

Indian and African, 2.8:1 lump, 48%	$39.00
South African (excluding war risk)	
No ratio lump, 44%	28.00
Do. 45%	29.00
Do. 48%	34.00
Do. concentrates, 48%	33.00
Do. 50%	34.00
Brazilian (nominal)	
2.5:1 lump, 44%	31.00
2.8:1 lump, 44%	32.50
3:1 lump, 48%	41.00
No ratio lump, 48%	35.00-35.50
Do. concentrate, 48%	33.00-33.50

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	....
S. African, 48%	65.00
Indian, 50%	68.00-70.00
Brazilian, 48%	....
Chilean, 48%	68.00-69.00
Cuban, 51%, duty free	83.00-85.00

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

				ELECTRIC FURNACE AND FOUNDRY GRADES										
				Low Phos. Grades										
	OPEN HEARTH GRADES*	Machine Shop Turnings	BLAST FURNACE GRADES*	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Cut Auto Scrap 3 ft. and less	Cut Auto Scrap 2 ft. and less	Cut Auto Scrap 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$16.00	$16.00	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Bethlehem	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Buffalo	19.25	15.25	15.25	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	15.50	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Detroit	17.85	13.85	13.85	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo	.....	13.85	13.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Kokomo	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth	18.00	14.00	14.00	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50
Portland, Oreg.	.....	.....	.....	.....	15.50	14.00	14.50	15.00	13.00	13.50	14.00	11.00	12.50	14.00

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	21.00	22.00	23.50	24.00	24.25	24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. Blast Furnace Grades refer to mixed borings and turnings, shoveling turnings, No. 2 busheling and cast iron borings. Add $5 per ton for chemical borings containing not over 0.5 per cent oil content.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, provided most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less (railroad grades $3.50 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, located in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington and Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

Sheets, Strip

Sheet & Strip Prices, Page 120

Expansion in orders for steel sheets for essential purposes is dislodging from rolling schedules practically all tonnage below A-1-a priority. Some mills recently were able to ship some tonnage under A-2 and A-3 preferences where need was urgent, but this no longer is possible for most mills.

Except in galvanized, sheet producers are booking some fair tonnages of hot and cold-rolled sheets in the A-1 group with deliveries around six weeks. What competition remains for sheet tonnage is confined to top ratings as semi-finished is available only against such ratings. Conversion to war production is radically revising specifications for various shops, stampers in many instances taking entirely different finishes from their normal use.

Galvanized sheet sellers are feeling somewhat easier over the outlook for use of zinc with tin content. A fortnight ago they were advised by Washington that they would no longer be allowed to use such zinc but later they were advised they could use it through this month. It now appears its use will be allowed on all government specifications, where bending to 180 degrees without flaking is required.

On hot and cold-rolled sheets deliveries in the A-1 rating can be made by some producers in five to eight weeks. In stainless steel rolling schedules are easier as producers are not allowed to accept tonnage below A-1-k and are limited in the purposes for which it is to be used. Nickel seems to be the limiting factor in stainless. Deliveries in this grade are better than for some time.

Heavy orders are being booked for hot and cold-rolled sheets for bomb components, ammunition boxes, airplane landing mesh and other war purposes, with volume offsetting decline in requirements for civilian products.

Plates

Plate Prices, Page 121

Plate producers generally are unable to accept tonnage below A-1 priority and sheared plate mills unable to do much below A-1-a, many consumers with preference ratings are receiving little tonnage. Certain groups, such as railway equipment builders, with A-3 rating, have been given special consideration by Washington in some car programs but even their limited quotas have been further restricted.

Plate shipments to jobbers have been curtailed by diversion to other purposes and some distributors have received practically no tonnage this month. Miscellaneous industrial demand is entirely tied in with war contracts and fabricating shops are actively quoting on inquiries for finished products outside their regular lines of production.

Allocations to eastern shipyards are lower in April but an increase is expected in May when deliveries start to a yard beginning work on a second lot of vessels.

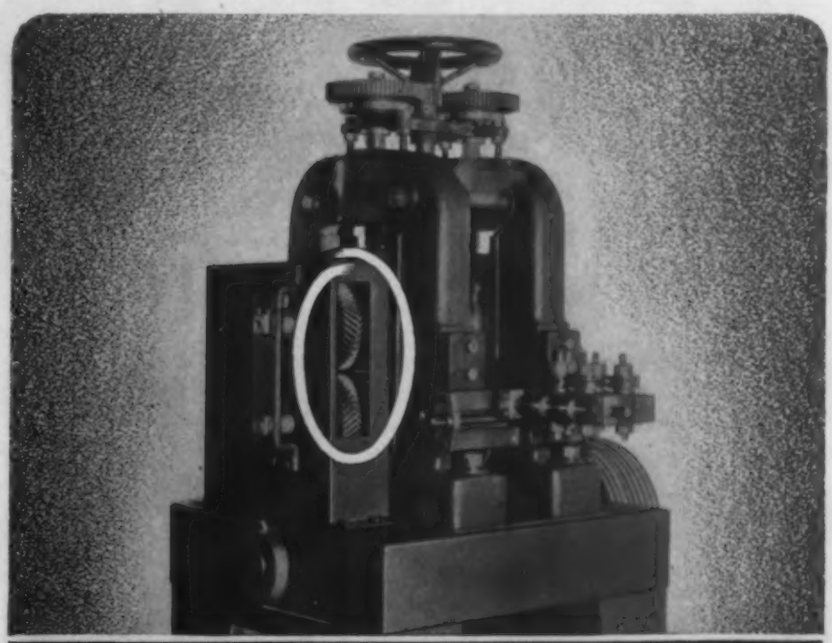
Bars

Bar Prices, Page 120

Strong and growing demand for alloy steel bars is accompanied by considerable revision of specifications. To ease the tightness in nickel-steel alloys, efforts are being made to substitute other grades where possible, even for aircraft; use of nickel-steel in jigs and fixtures is being discouraged. In high-speed steels and certain types of hot work, the tendency is toward lowering tungsten content with more molybdenum or vanadium, revising heat-treatments for new alloy combinations. In most instances these revised specifications meet requirements satisfactorily.

Forward orders for bars are heavy, contracts being frequently extended indefinitely on top ratings, with releases each month tending upward. Substitution of steel for aluminum is also being made in some ordnance products, including fuze parts. Cold-finished, open hearth and bessemer, are required in large quantities for increasing screw machine work.

The forging industry is heavily



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☆ "HARD-DUR" Gears are available in Spur, Spiral, Helical, Herringbone, Bevel and Mitre types.

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GEARS AND SPEED REDUCERS

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engaged on aircraft. For forged chain-making approximately 1065 tons of nickel-molybdenum-vanadium hot-rolled steel round bars have been placed on a delivery basis, rather than to the low bidder, Carnegie-Illinois Steel Corp., Pittsburgh, getting the award. Much of this type of tonnage, for better shearing ability, has to be slow-cooled after rolling.

Rails, Cars

Track Material Prices, Page 121

Freight car builders apparently have a program for 37,000 cars for the remainder of this year under the recent control instituted by War Production Board. It is understood allocations of steel will be provided for about 19,000 cars remaining in the original SPAB program for 36,000 cars for the first four months, and for 18,000 additional. Wood will be used wherever possible with regard to safety, thus saving considerable steel.

Under the circumstances some programs have been dropped and probably a portion of cars now on books will not be built. Ore and tank cars seem likely to be given preference in view of requirements for expanded ore production and movement of oil and gasoline, for which tankers are not now available.

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Pipe

Pipe Prices, Page 121

Buying of lap weld steel pipe, largely six-inch, on high ratings for installation in connection with war requirements continues brisk. Buttweld demand from the plumbing and heating trade is slackening. A midwest mill recently took a $100,000 order for lapweld, delivery at two points. Indications are second quarter quotas for lapweld will be much harder to fill than for butt pipe, there being some price shading on the latter. Wrought pipe sales are substantially ahead of last year. Tubing producers are heavily booked with direct-mill volume, notably for aircraft, and jobbers are able to get little aircraft tubing grades below A-1-c.

Wire

Wire Prices, Page 121

Wire production continues to be hampered by inadequate supply of wire rods. Orders for specialties are heavier, with schedules complicated by large lend-lease commitments for Russia, including specialties as well as coarser materials, which have been ordered processed ahead of everything else.

Specialty tonnage, such as valve and other spring wires for aircraft, is at a high ratio. Demand for high-carbon rounds is materially higher than for flats and most bookings are at A-1. Wire rope mills are engaged at capacity and pressure for strand wire is heavy and as a rule being met satisfactorily.

Pig Iron

Pig Iron Prices, Page 122

Relief has been afforded by Office of Price Administration to pig iron producers in cases of dislocated tonnage, material shipped out of the normal area they supply. The added freight charge formerly was absorbed by the seller. The new ruling provides that in cases where OPA rules the shipment is outside the producer's usual area, due to war emergency, the seller is permitted to charge the basing point at the nearest point of origin for the shipment, plus the differential in the schedule, plus freight from basing to delivery point, less $1 gross ton.

Producers received relatively few applications for pig iron on B priorities for May delivery, continuing the trend of several months. Such as were received were seldom for more than a single carload.

Allocation plan continues to work smoothly for the most part, most difficulty arising from consumers failing to get their applications in on time. Distribution is being based largely on inventory and investigators for WPB are surveying foundries as to inventory, consumption and rating of castings users, with a view to further refining distribution as among shops operating on most important war work.

Mystic Iron Works, Everett, Mass.,

whose furnace is down for relining, has been given permission by OPA to increase prices $1 per ton, based on its application citing higher costs, including ore transportation from the lakes.

In granting Mystic Iron Works, Everett, Mass., authority to sell pig iron at $1 a gross ton over the maximum ceiling prices, OPA cited severe competitive disadvantages caused by the furnace being cut off from source of foreign ores and being forced to pay high freight charges for Lake Superior ores; increased costs of limestone and coal have also added to the burden. Expenditures for furnace relining and depreciation charges could not be met under ceiling prices established in the pig iron schedule, OPA found. The company could, however, cover direct costs in the opinion of OPA, based on the data studied.

Structural Shapes

Structural Shape Prices, Page 121

Fabricating shops are crowded with high-priority work and deliveries are slower. In some cases no better than 10 to 13 weeks can be done on A-1-c ratings and 8 to 12 weeks on the two higher priorities. Under these conditions many projects originally designed for steel are being revised to use concrete or wood, especially the latter, as reinforcing bars also are scarce. The trend to timber construction is gaining as inability to obtain shapes becomes more apparent.

Reinforcing Bars

Reinforcing Bar Prices, Page 121

Orders for reinforcing bars bearing high priorities are heavy and new tonnage is frequently allocated. Most sellers are not considering inquiries below A-1-j. Deliveries on orders with low ratings are delayed and some work is threatened with abandonment unless ratings are revised upward. Wood is being utilized in place of concrete in many instances. Small lots from warehouses require high priority as replacements are limited.

Scrap

Scrap Prices, Page 124

Freer supply of scrap is coming out, allowing many producers to increase their steelmaking operations and in a few instances giving hope that through the summer some reserves may be accumulated for winter. Occasional shortages occur and in some areas it has not been possible to relight open hearths made idle by lack of supply. The improvement has not been allowed to cause scrap collection programs to lose force and efforts are continued to get all possible tonnage from hiding places.

Mining of steel and iron from slag dumps accumulated for years at steel plants is being enlarged and considerable metal is being reclaimed in this way. In older slag deposits the yield is large as more metal was allowed to be wasted in early days than recently.

A survey of the entire situation is getting under way in New England, checking production, collection, consumption and flow, under direction of OPA. Borings and turnings production there is heavy but much is not segregated and contains more than the maximum of oil for applying the $5 per ton extra for borings.

Detroit shops working on aircraft are expected to supply a large tonnage of alloy scrap borings and turnings when production reaches a maximum, as machining for planes frequently amounts to 60 to 80 per cent of the rough steel.

Receipts at St. Louis have been reduced recently by a period of heavy rains. One effect was to prevent addition of an open hearth planned for production and to cause another to be taken off. Allocation of 25,000 tons for the Granite City Steel Co. has been completed. An allocation to aid Laclede Steel Co. is expected.

Buffalo police, fire and health departments have been enlisted in the drive to uncover dormant scrap. Members of these organizations report accumulations they encounter on their regular inspections. A number of substantial lots have been reported. Various drives in the Buffalo district are estimated to have found more than 60,000 tons

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The Brosius Auto Floor Charging Machine in above cut is arranged to handle a 7′0″ charging box with a load of 5000 lbs. It is self contained, requires no tracks or expensive runways, and its movement is not restricted to any definite path. It is driven by an electric motor, while its steering, tilting of the peel, and rotation of the box are actuated through hydraulic cylinders.

The Brosius Auto Floor Charger is also arranged with tongs for serving heating furnaces, mills, hammers, presses, etc., and are designed as manipulators for manipulating pieces while being forged.

Capacities: 2,000 lbs. to 20,000 lbs.

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which otherwise would not have been made available.

Melters in the Cincinnati district find supplies the best in several months, but are consuming practically all that is available. Some rejections have been made by foundries in that area, involving substandard grades formerly accepted as better than nothing.

Pacific Coast

San Francisco—Featuring the market was the recent award of 56 tankers for the Maritime Commission to Kaiser Co. Inc. These ships will require 231,168 tons of plates and 22,904 tons of shapes, and the award replaces the award of 70 Liberty ships, EC-2 type, involving 153,250 tons of plates and 54,600 tons of shapes, reported in March.

While demand for reinforcing steel bars continues unusually strong, only government awards were reported. Identical bids were submitted by Carnegie-Illinois Steel Corp. and Sheffield Steel Corp. on 925 tons for the Bureau of Reclamation for delivery at Corma, Calif. Pending business for this branch of the government involves over 4500 tons. Bookings to date total 14,526 tons, compared with 22,174 tons for the corresponding period in 1941.

Cast iron pipe interests are receiving more inquiries from the government than they can produce, Few inquiries are current for municipalities. Bookings totaled only 512 tons and brought the aggregate to date to 3475 tons, compared with 13,980 tons for the same period last year.

Seattle—Industrial activity is occupied solely with defense and military work, many smaller shops reporting subcontracts. There is a noticeable increase in A-1-a ratings, particularly for reinforcing and merchant bars.

Mayor Fred Hume, New Westminster, B. C., announces that an American shipbuilding firm is seeking permission to establish a yard near New Westminster, to construct steel freighters up to 10,000 tons.

Northwest Steel Rolling Mills, Seattle, established a production record in March and has increased output about 40 per cent. An additional transformer will be installed this month and a third crane has been ordered. Construction of a new foundry, which will be the largest on the west coast, for the Pacific Car & Foundry Co., Seattle, is under way, 1000 tons of shapes being placed with Judson Pacific Co., Seattle. This plant is scheduled for completion by Dec. 31.

Tacoma has awarded contracts for the second Nisqually power project to L. E. Dixon Co., Los Angeles, $4,258,535 for the Adler dam, powerhouse and spillway and $1,705,849 for the LaGrande dam and spillway. A bid of $1,783,055 for the tunnel is pending. This job involves unstated tonnages of reinforcing, shapes and plates. Seattle has applied for 30 per cent federal aid for proposed $8,000,000 expansion of Ross dam, Skagit project, raising spillway 150 feet. At Grand Coulee the third generator is in production, increasing capacity to 344,000 kilowatts. Orders for six additional generators, to be installed by 1944, have been placed.

Scrap has been arriving in such volume that a 90-day supply is said to be on hand here. Receipts have increased due to improved weather conditions and stabilization of prices. Surplus stocks here will probably be shipped to other coast cities where supplies are low. Mills are buying half of their needs direct, the balance from dealers, who complain price ceilings do not allow them sufficient margin to cover preparation costs.

Canada

Toronto, Ont.—Demand for steel in Canada is developing on an ever broadening scale and new restrictions on non-essential production are being introduced. Production of civilian automobiles was brought to a stop in Canada, April 1. There are now about 4000 passenger automobiles in reserve from which essential users will be supplied. In addition there are some 10,000 cars in hands of dealers, and a large number of used cars still available, which will be the only source of supply until the end of the war. A special order prohibits manufacture of about 65 per cent of the former sizes of bolts and screws. Of Canada's total steel production al-

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most 95 per cent now is being directed into channels associated with war materials production and new restrictions have been placed on sales of steel products which practically shuts out all but the most essential consumers. Under a ruling of the past week all new orders for steel, no matter what the product may be, must be approved by the Steel Controller before delivery can be made.

Orders for merchant bars are increasing. Mills are booked through the year. Business continues at a steady level in merchant pig iron. Production of foundry and malleable grades is holding at about 8000 tons per week and shipments to melters also are at this level with the result that blast furnaces are not building yard piles. Basic iron sales held at about 1500 tons for the week.

Special efforts are underway to create larger supply of iron and steel scrap in Canada and with this object in view new price regulations were issued during the week from the Canadian Steel Controller, which place a minimum price on scrap in Western Canada and new ceiling prices in the Maritime and British Columbia.

Metallurgical Coke

Coke Prices, Page 121

Rulings by OPA on price schedules applying to beehive and by-product coke, providing for applications by producers for permission to charge higher than present ceiling prices may result in some exceptions. Some cokemakers have submitted data on their costs but have not yet received replies.

OPA has ruled that producers asking permission to charge above ceiling prices must show that production costs are above oven net realization at ceiling prices or that oven net realization is inadequate for continued operation at maximum prices.

Steel in Europe

Foreign Steel Prices, Page 123

London—(*By Cable*)—Steel market in Great Britain is active on second quarter contracts. Demand is mainly centered on plates, alloy steels, engineering castings and forgings, colliery material and small sections of bars and wire rods. Sheets are quiet and demand for galvanized sheets is practically negligible.

Iron Ore

Iron Ore Prices, Page 123

Ice last week in upper St. Mary's river delayed downbound ore carriers, at one time 80 laden ships being held above the locks. Ice slowed operation of lock gates materially.

Additional companies engaged in ore carrying on the Great Lakes have announced rates for this season at 80 cents per gross ton from the head of lakes, 72 cents from Marquette and 60 cents from Escanaba, to Lake Erie ports. Rates on coal have been set at 45 cents per net ton from Lake Erie ports to Lake Superior destinations, 50 cents to west shore ports on Lake Michigan north of Milwaukee and 55 cents to Milwaukee and ports further south. The new ore rates are the same as in 1939 and are 3 cents higher than in 1941 from the head of the lakes, 2½ cents higher from Marquette and 2 cents from Escanaba.

Up to April 7, 41,469 railroad carloads of coal had been dumped into colliers at Lake Erie ports, compared with 16,676 carloads up to the same date last year, according to Howard A. Gray, acting director of solid fuels co-ordination.

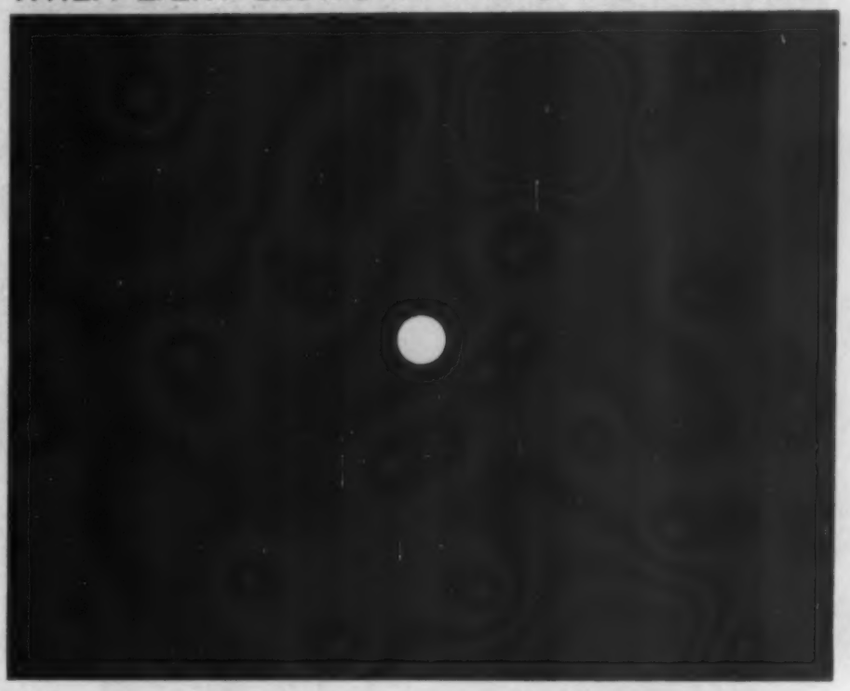
Ferroalloys

Ferroalloy Prices, Page 122

April 15 has come and gone without ferromanganese producers having been advised by OPA as to what action will be taken on their appeals for higher prices. Consequently, producers are still sitting tight, shipping tonnage as heretofore on the basis of $120, duty paid, seaboard, and, in the case of certain southern furnaces, on the basis of $140, f.o.b. furnace.

What action will finally be taken is still a matter of speculation, not only with respect to the prices themselves, but to the effective date of changes.

WHEN LIGHT GLOWS IN THE DARKNESS.....



If you are concerned with bearings and bearing metals, but have never taken time to brush up on pertinent and intimate information regarding them, the entire subject may remain shrouded in darkness. A little light puts you on the right track, and helps your constructive thinking. The A. W. Cadman Manufacturing Co. turned the spotlight on the subject with two booklets, "Bearings and Bearing Metals," and "Cadman Metals." Printed for free distribution to all who are concerned with the subject of bearings and fine bearing metals, the booklets may be had for the asking. When do you want yours?

A. W. Cadman MFG. CO., PITTSBURGH, PA.
CHICAGO PHILADELPHIA NEW YORK

Nonferrous Metal Prices

April	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. smelter	Nickel Cathodes
1-17	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.50	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, 100 lb. base	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices

(In cents per pound, carlots.)

Copper

No. 1 heavy	9.50-10.00
Light	7.50- 8.00

Brass

No. 1 composition	9.00- 9.50
Light	6.00- 6.50
Heavy yellow	6.50- 7.00
Auto radiators	7.25- 7.75
Composition turnings	7.75- 8.25

Zinc

Old	5.25- 5.75
New clippings	6.75- 7.25

Aluminum

Clippings	10.50-11.00
Cast	10.00-10.50
Pistons	10.00-10.50
Sheet	10.00-10.50

Lead

Heavy	5.12½-5.62½
Mixed babbitt	6.00- 7.00
Electrotype shells	5.00- 5.75
Stereotype, Linotype	6.50- 7.50

Tin and Alloys

Block tin pipe	45.00-47.00
No. 1 pewter	37.00-39.00
Solder joints	9.50-10.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l.	13.25
Standard No. 12 aluminum	14.50

HERE ARE TWO SERVICES TO HELP YOU

Quickly **REACH** *Top-Speed Production!*

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- Pressure Testing
- Drilling and Tapping
- Drawing and Stamping
- Hot-dip galvanizing
- Hot or Cold Riveting

Send your blueprints for quotation. If you have the Priority Ratings necessary to get materials, we have the men and machines to do the work!

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OAKMONT, PA.
(Pittsburgh District)
Representatives in Principal Cities

Nonferrous Metals

New York — OPA has issued amendment No. 3 to the revised price schedule No. 20 establishing a maximum price for yellow brass scrap on the basis of the dry copper content times 9.25c where the assay is 60.01 per cent or more and at the dry copper content times 9.00c where the assay is 50.01 per cent to 60.00 per cent. In lots of less than 20 tons refinery brass may be bought and paid for on the copper content basis determined by an estimate rather than by an assay. Sales concluded before April 17 under previous provisions may be carried out in accordance with original terms until June 1.

Both OPA and WPB have taken action to assure full compliance with all orders. Need for metals by companies engaged in war work are increasing. Demand for brass by new mills producing shell casings is expected to rise sharply. Supply of lead still remains adequate for all military work while zinc sellers continue to accept orders freely for delivery through July. Full allocation of zinc is expected to be ordered June 1.

Coke Oven By-Products

Coke By-Product Prices, Page 121

Large percentage of coke oven by-products is going to war requirements, entire production on some, including toluol, being allocated. Substantial quantities of benzol will be required for synthetic rubber production and early prohibition of use of that product in blending of motor fuel is expected, with the hope of building up a substantial reserve for that purpose. Current output of benzol from coke oven operations is at record high, estimated at 160,000,000 gallons annually. Normally close to 75 per cent goes into blending of motor fuels and a large part of the remainder to industrial consumption.

Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

GOVERNMENT INQUIRIES . . .

The following prime contracts are pending, with closing dates for bids as indicated. QR refers to quantity required. Bidding forms on these items can be obtained only by wiring, mentioning schedule number, to the Procurement Branch of the service heading the list of requirements. Field offices of Contract Distribution Branch, WPB, generally have available for inspection and examination, schedules, invitations, specifications and drawings (where required) concerning these contracts.

BUREAU OF SUPPLIES AND ACCOUNTS, WASHINGTON

551—Portable submersible pumps and spare parts. Bids April 21.

734—Abrasive wheels. Bids June 2.

683—Ammunition boxes. Bids April 24.

GENERAL PURCHASING OFFICER, PANAMA CANAL, WASHINGTON

6127—Lead sleeving, copper splicing sleeves, tinned copper sleeve connectors and copper link fuzes. Bids April 20.

6122—Copper coated steel wire, phosphor bronze wire, magnet wire and flexible heater cord. Bids April 20.

6121—Electric wall clocks, ceiling type fans. Bids April 20.

6128—Deep bowl type reflectors. Bids April 20.

6117—Knife and snap switches, receptacles and plugs, lamp sockets, terminals, electric bells and pressboard insulation. Bids April 20.

VETERANS' ADMINISTRATION, WASHINGTON

M-408—Hot water storage heater. Bids April 24.

M-409—Alternating current arc welding unit. Bids April 24.

M-387—Power-driven sickle-bar mower. Bids April 21.

M-412—Half-horsepower portable electric spray painting outfit. Bids April 27.

M-396—Hot water storage heaters. Bids April 22.

M-401—Laundry trucks. Bids April 27.

SUB-CONTRACT OPPORTUNITIES . . .

Data on subcontract work are issued by local offices of the Contract Distribution Branch, WPB. Contact either the office issuing the data or your nearest district office. Data on prime contracts also are issued by Contract Distribution offices, which usually have drawings and specifications, but bids should be submitted directly to contracting officers as indicated.

Boston office, Contract Distribution Branch of WPB, 17 Court street, is seeking contractors for the following:

SC-7: Engine lathe to 12-inch; horizontal boring mill to 3-inch bar with index head and oil grooving; horizontal millers to No. 2 and drilling to 1-inch capacity, horizontal boring to 2-inch bar; lathe to 12-inch, horizontal milling No. 2 boring, horizontal, with index head. Milling, horizontal No. 3, vertical, No. 2 drilling to 1-inch capacity, horizontal boring 2-inch bar.

SC-8: Machines needed, watchmakers' automatic screw machines, lathes and kick presses.

SC-9: Machines needed 2½-inch single or multiple-spindle automatic screw machines to make any portion of 100,000 units. Blueprints available at this office. Immediate work assured.

Cleveland office, Division of Contract Distribution, WPB, Union Commerce building, is seeking contractors for the following:

S-132: Facilities for fabricating the following items: Worm wheel, WD 4140 steel, 2.75 O.D. x 1.2187 plus .0005/—.0000 x .812 plus .000/—.002; .375 pitch and lead worm; left-hand helix; 12 teeth on flat side. Pinion, WD 4140 steel, 5 23/32 long x 1.75 major diameter; six splines on end (ground); has 12 teeth, 1.75 O.D. gear; 3 diameters ground plus or minus .0002; two threads, one ⅛—14 NF3, other ⅛—20 NF3. Clutch, WD 4140 steel, 2.31 long, 2⅛ diameter; broached hole ⅜—14 NF3, internal thread; 12 teeth on flat end, ground finish.

S-133: Manufacturer wanted with heat treating centerless precision grinding facilities to finish screw machine parts. Quantities, 5000 to 10,000 pieces of 12 items.

S-134: Steel casting and finishing facilities needed. Five castings weighing 9000, 21,600, 3260, 3500 and 1750 pounds. Tools required are, 80-foot planer, 5 or 6-inch boring bar and horizontal mill (either Giddings & Lewis, Lucas or similar machine). Tolerance plus or minus .001. Quantity, one complete set per week for duration of war.

S-135: Subcontractor to machine cross rail for vertical boring mill. Cross rail is 30 x 30½ inches by 13 feet 4 inches. Equipment indicated is 6-foot openside planer, horizontal boring mill and 4-foot radial drill. Blueprints on file in Youngstown, O., office.

S-136: Subcontractor to machine rail head for 78-inch boring mill. Equipment indicated is 3-foot openside planer or 4-foot housing planer, 2½-inch horizontal boring mill, 4-foot radial drill, No. 4 horizontal mill. Blueprints on file in Youngstown, O., office.

S-137: Subcontractor with equipment to fabricate 50,000 of each of four items. Delivery to start Sept. 15, 1942. Material, to be furnished by subcontractor, is steel forgings, but alternate of bar stock and tubing provided. Machine equipment governed by type of material furnished.

S-138: Subcontractor to machine and thread large quantity of four items to be made from seamless steel tubing WD 1015, ranging in finished diameter Screw machines and chucking machines from approximately 2.775 to 6 inches, indicated. Blueprints on file in this office.

S-139: Subcontractor to fabricate any part or all of six items. Materials made from bar stock ranging diameter from ¾ to 1.65 inches approximately. Stainless grade No. 6, WD-X1112 and WD-X1314; one item seamless steel tubing 1⅛-inch. Equipment indicated is automatic screw machines, drills, mills, etc. Quantities, large. Delivery, May, 1942. Blueprints on file at this office.

Chicago office, Contract Distribution Branch of WPB, 20 North Wacker Drive, is seeking contractors for the following:

BAT-0-1209: Chicago prime contractor wishes to subcontract work on items of a recurring nature which will continue probably for the duration. Requires automatic screw machine for stock ⅞, ¾ and 1¼-inch diameter. Also knurl blanks to be made from 1⅛-inch Ketos steel are needed immediately. Prime contractor has steel on hand for this work. Drawings at this office.

CMC-1010: Urgent requirement for gear-cutting equipment capable of turning out 600 to 1200 bevel gears per month, for use in aircraft motors. Tolerances are close. Most gears will be integral with shaft and will be between 1⅛ to 2-inch P.D. All material to be furnished by prime contractor.

YSLC-A-1202: An eastern manufacturer has work to sublet for a horizontal boring mill with a 4 or 5-inch bar. In addition to this requirement we have on our list several other concerns which require horizontal mills with bars up to 6-inch.

24-F-A-217: Prime contractor on tanks has subcontract work to let for 7-inch or larger vertical boring mills, large Keller machine or horizontal boring mills with 5-inch bar. Parts involved weigh approximately 3 tons each. This is urgent and carries a top priority number which supersedes much work at present on this type equipment.

29-F-A-220: Midwestern manufacturer wishes to sublet machine work requiring 6 or 8-spindle Gridley or Conematic 1¼-inch automatic screw machines. As a substitute may consider 4-spindle machines of same make or National Acme automatic screw machines. This subcontract will require large daily production and continuous run. Initial order for 500,000 pieces. Material has been ordered by prime contractor and will be delivered to subcontractor at stated price f.o.b. Cleveland or Gary, Ind. Blueprints and sample at this office.

35-N-226: Prime contractor has immedi-

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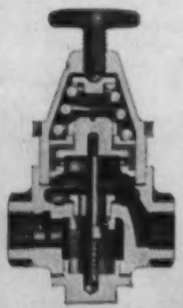

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Piston type construction with long valve stem travel gives large volumetric capacity—a most important feature. Construction throughout is simple and dependable for long life without maintenance.

Use these valves for efficient operation of arbor presses, air chucks, riveters, air vises, cylinders and other pneumatic equipment. Three standard sizes, ⅜, ½, and ¾ inch, for use on initial pressures up to 150 lbs. Furnished complete with pressure gauge. Write for Bulletin 56-S.

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ENGINEERS • DESIGNERS • MANUFACTURERS • DOUBLE-ACTING PNEUMATIC AND HYDRAULIC CYLINDERS • ALL SIZES

HANNIFIN *pressure regulating* **VALVES**

ate work to subcontract for spur, pinion and bevel gear, eleven parts, reference drawings here: three sizes bevel gears, 4615 steel, 7¾, 10 and 10½-inch extreme diameters, 20 and 30 teeth, splined holes, broached 2¼-3⅛ inches; carburize and harden to Rockwell 58-63. Four sizes propeller and drive shafts, 27, 34, 20 and 24 inches long, 2¼, 2⅛ and 3⅛-inch diameter with splined ends and threaded shoulders, 6140 and 2340 steel, heat treated to Rockwell C 35-28. Subcontractors can take any item. Quotations are to include separately, tools, jigs, gages, etc. Optional furnishing patterns and material. Initial quantity 500 pieces of each size. Delivery at once, production to continue indefinitely. Priority A-1-A.

2-A-404: 3000-pound board hammer, open capacity required for small forgings in Chicago area. Dies and materials to be furnished.

5-AN-403: Chicago firm needs several sizes of small accurately assembled and welded work holding fixtures and jigs. These consist of usual steel sections, positioning plates and will weigh up to 25 pounds. Quantities 1 to 40 pieces. Navy priority. Subcontractors furnish both labor and materials. Tools needed, shapers, drills and milling machines.

9-A-403: Expert rough and finish grinding on surgical operating knives is needed at once; 1000 forged steel blanks in three sizes are ready. Only individuals or firms with actual experience at this will be considered.

26-AN-328: Airplane landing gears are needed. This office has request to locate machine tool facilities capable of producing oleo strut cylinders and pistons. Cylinders are 28 inches long, 3-inch bore, 3⅛ inches O.D. Tools needed are turret lathe, 8-foot bed or over, heat treating, Rockwell, sand blast, external grinding, internal grinding, polish, hone, Magnaflux, cadmium plate and dip. Piston 28 inches long, 2.358 bore, 2.874 O.D. AA and A-1-a priority. Any quantity from 20 per month up.

2-A-402: Machine work on aluminum castings. Critical machines include turret lathes for chucking, milling machines. Production of 1000 each of several pieces per month.

New York office, Contract Distribution Branch of WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:

S-86: A New Jersey firm working on marine orders is seeking subcontractors to produce parts. Machine needed, 100-inch planer, 16-foot travel.

S-87: A New Jersey manufacturer wants subcontractors who can machine large steel castings. Machine needed is horizontal boring mill with 5-inch bar.

S-88: A New Jersey manufacturer needs subcontractors who can produce drop forging equipment for die forgings of steel parts. Approximate weight per piece, one pound. Quantity, large.

STRUCTURAL SHAPES .

SHAPE CONTRACTS PLACED

22,000 tons, new plant, Aluminum Co. of America, to American Bridge Co., Pittsburgh.

11,000 tons, nonferrous metals plant, Brooklyn, to Bethlehem Steel Co., Bethlehem, Pa.

4500 tons, two plant additions, Syming-

ton-Gould Co., New York state; 2000 tons to Lackawanna Steel Construction Co., Buffalo; 2500 tons to Leach Steel Corp., Rochester, N. Y.

4000 tons, Du Pont chemical plant, Alabama, to Virginia Bridge Co., Roanoke, Va.

3000 tons, plant addition, Curtiss-Wright Corp., to Bethlehem Steel Co., Bethlehem, Pa.

2500 tons, aluminum forge shop, Chevrolet Motor Division, General Motors Corp., to R. C. Mahon Co., Detroit.

2100 tons, floating dry dock, contract NOy-5269, Gulf port, Bureau of Yards & Docks, to Southern Steel Works Co., Birmingham, Ala.; Paul Douliot and J. P. Ewin, New Orleans, contractors.

1800 tons, transmission towers, Tacoma, Wash., power project, to Bethlehem Steel Co., Seattle.

1000 tons or more, two 250-ton bridge cranes, low bid $601,510, for gun relining plant, to Alliance Machine Co., Alliance, O.; Morrison-Knudsen Co., Boise, Idaho, general contractor.

1000 tons, foundry plant for Pacific Car & Foundry Co., to Judson-Pacific Co., San Francisco.

1000 tons or more, nine substations for Bonneville Power Administration, to Bethlehem Steel Co., San Francisco.

750 tons, utility building, navy yard, to Harris Structural Steel Co., New York, through Sanders Engineering Corp., Portland, Me.

600 tons, defense project, to Pacific Car & Foundry Co., Seattle.

430 tons, sub-structures for Bonneville dam project, Oreg., at Bremerton, Longview, Napavine, Walla Walla, Covington and Spokane, Wash., and at Portland, Salem and Eugene, Oreg., to Bethlehem Steel Co., San Francisco.

350 tons, powerhouse at Seward, Pa., for Atlantic Utilities Co., to American Bridge Co., Pittsburgh.

300 tons or more, hangar doors for army project in western area, to unstated Detroit fabricator.

300 tons, foundry addition, Sawbrook Steel Casting Co., Lockland, O., to Southern Ohio Iron Co.

247 tons, Proj. FAP-24-D (1) Job 2311, Chicot county, Ark., to Vincennes Steel Corp., Vincennes, Ind.

225 tons, furnace, Ridgewood Steel Co., Cincinnati, to Stacey Mfg. Co., Cincinnati.

205 tons, Proj. DA-WR-2-A (1), Oklahoma state highway department, Commanche county, Okla., to J. B. Klein Iron & Foundry Co., Oklahoma City, Okla.

200 tons, Peavy power house and dam, Wisconsin - Michigan Co., Mastoden, Mich., to Fox River Boiler Works, Appleton, Wis.

159 tons, addition, Caterpillar Tractor Co., Peoria, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.; Fred Harbers Sons' Co., Peoria, Ill., contractor.

100 tons, army building, details not announced, to Truscon Steel Co., Seattle.

100 tons, transmission towers, Boulder City, Nev., to Emsco Derrick & Equipment Co., Los Angeles.

100 tons or more, hangar, lean-to and boiler house, southern airfield, to Wisconsin Bridge & Iron Co., Milwaukee; bars to Wilson, Weesner & Wilkinson; C. F. Rule and Wm. Murphy & Sons, St. Paul, Minn., contractors.

SHAPES CONTRACTS PENDING

10,000 tons, plant expansion, Curtiss-Wright Corp.

5000 tons, nonferrous metals plant, Boston.

1000 tons, addition, Otis Elevator Co., Harrison, N. J.

1000 tons, crane runways, naval supply depot; Bramm & Stuart, Philadelphia, general contractors.

1000 tons or more, power plants, Baton Rouge and New Orleans, La.; Stone & Webster Engineering Corp., Boston, contractor-engineer.

761 tons, also 118 tons plates for stack, Dresser power stations, Public Service Co. of Indiana, West Terre Haute, Ind.; Sargent & Lundy, Chicago, engineers; bids April 15.

600 tons, plant addition, Chambersburg

SHAPE AWARDS COMPARED

	Tons
Week ended April 18	57,966
Week ended April 11	24,194
Week ended April 4	44,693
This week, 1941	30,911
Weekly average, 1942	26,097
Weekly average, 1941	27,373
Weekly average, March, 1942	18,011
Total, 1941	490,564
Total, 1942	390,101

Includes awards of 100 tons or more.

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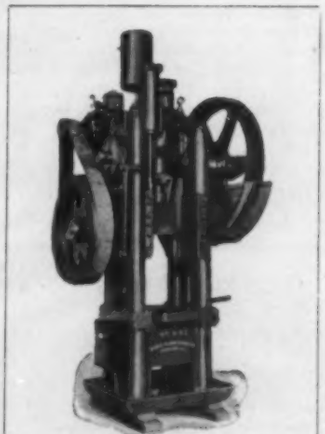

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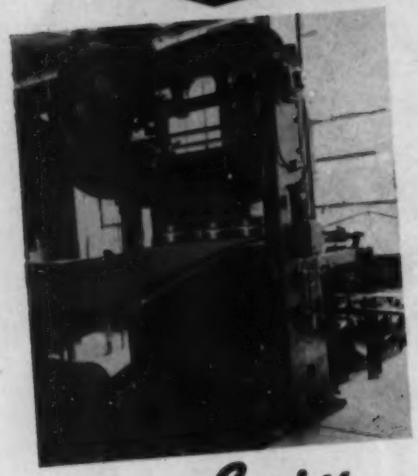

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● Five sections of 7" BISCO Tool Steel Tubing are used in this gang press to stamp out sandpaper discs. Day after day, millions of needle-sharp cutting edges in the abrasive material tear at the die surfaces. Yet 128,000 discs were stamped in one setting. Each die stamped out 25,600 abrasive discs without being taken out for sharpening! This figure doubles all previous records of any other die steel.

No time, labor or money was wasted in costly boring operations to make these dies. BISCO Tool Steel Tubing was simply cut to specifications out of stock carried in our warehouse. Exact in size, the dies were ready for use upon delivery.

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IMMEDIATE DELIVERY:
Finished Bars
Alloy Steels
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in all S. A. E. grades

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Engineering Co., Chambersburg, Pa.; Hughes-Foulkrod, Philadelphia, general contractor.

518 tons, bearing piles, improvement Los Angeles river between North Broadway and Alhambra avenue, Los Angeles; bids opened by United States engineer office, Los Angeles.

500 tons, state bridge, Saucon creek, Bethlehem, Pa.; bids April 20.

500 tons or more, transmission tower No. 3, Bonneville Power Administration; W. L. Ridge, Electric City, Wash., low at $212,380.

400 tons, access bridge, eastern navy yard; Acchione Construction Co., Philadelphia, low on general contract; priority A-1-e.

150 tons, state bridge, Bayonne, N. J.; bids April 24; priority A-3.

120 tons, bridge for Alaska Road Commission; bids to J. R. Ummel, purchasing agent, Seattle, April 27; No. 09797.

Unstated tonnage, $2,000,000 project, Pennsylvania Salt Co., Cornwall, Pa.; Day & Zimmerman, Philadelphia, preparing plans.

Unstated, revolving crane mounted on railroad truck, for Alaska Railroad; bids to J. R. Ummel, purchasing agent, Seattle, April 22; No. 09803.

REINFORCING BARS . .

REINFORCING STEEL AWARDS

1036 tons, mostly ½-inch squares, United States engineer, Norfolk, Va., to Carnegie-Illinois Steel Corp., Pittsburgh, inv. 235.

1000 tons, aluminum reduction plant in Eastern Washington, to Northwest Steel Rolling Mills, Seattle.

1000 tons, miscellaneous defense projects in western area, to Northwest Steel Rolling Mills, Seattle.

925 tons, bureau of reclamation, inquiry B-33, 105A, Coram, Calif., to Sheffield Steel Co., Kansas City, Mo.

580 tons, drydock No. 4, Pacific coast area, to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, factory addition, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., to Bethlehem Steel Co., Bethlehem, Pa.

REINFORCING STEEL PENDING

4000 tons, municipal filtration plant, Philadelphia; Robert and Joseph Sordari, low on general contract; priority A-4.

925 tons, Bureau of Reclamation, Invitation B-33,105-a, Coram, Calif.; identical bids submitted by Carnegie-Illinois Steel Corp. and Sheffield Steel Corp.

112 tons, underpass, Virginia avenue N.W., Washington; Colmar Construction Co., New York, low.

110 tons, highway, Washington; bids in.

Unstated, dams and powerhouses, second Nisqually power project, Tacoma, Wash.; L. E. Dixon Co., Los Angeles, contractor.

CONCRETE BARS COMPARED

	Tons
Week ended April 18	4,741
Week ended April 11	13,840
Week ended April 4	6,550
This week, 1941	14,596
Weekly average, 1942	8,464
Weekly average, 1941	13,609
Weekly average, March, 1942	9,201
Total, 1941	184,875
Total, 1942	126,966

Includes awards of 100 tons or more.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Alabama, Tennessee & Northern, one 80-ton diesel-electric switcher, to General Electric Co., Schenectady, N. Y.

Duluth, Missabe & Iron Range, ten 2-8-8-4 type steam locomotives, to Baldwin Locomotive Works, Eddystone, Pa.

LOCOMOTIVES PENDING

Baltimore & Ohio, twenty-five 1000-horsepower diesel-electric locomotives, pending.

Bureau of Reclamation, Denver, one 40-50 ton diesel-electric for yard use; bids in.

CAR ORDERS PLACED

Canadian Pacific, 500 forty-ton steel box cars, to Canadian Car & Foundry Co.; 200 fifty-ton steel box cars and 150 seventy-ton ore cars, to National Steel Car Co. Ltd.; 50 fifty-ton box cars, to Eastern Car Co. Ltd.

Pittsburgh & Shawmut, 100 fifty-ton steel twin hoppers, to Pressed Steel Car Co., Pittsburgh.

CAR ORDERS PENDING

Seaboard Airline, 500 fifty-ton box cars; reported under negotiation.

PIPE . . .

CAST PIPE PENDING

580 tons, 18-inch water line near Syracuse, N. Y.; bids April 21.

383 tons, 8-inch, class 150, San Francisco; United States Pipe & Foundry Co., Burlington, N. J., low.

320 tons, 12-inch, class 150, east bay municipal utility district, Oakland, Calif.; United States Pipe & Foundry Co., Burlington, N. J., low.

200 tons or more, water system extension and disposal plant, Hermiston, Oregon; J. M. DeBlasio, Yakima, Wash., recommended for award.

125 tons, 16-inch, Seneca Falls, N. Y.; bids April 23.

STEEL PIPE PLACED

Unstated tonnage, air field fueling system, Ohio, to Poliak Steel Co., Cincinnati; Cotter Plumbing & Heating Co., Memphis, Tenn., contractor.

PLATES . . .

PLATE CONTRACTS PLACED

100 tons, 300,000-gallon tank and tower, Vallejo, Calif., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

100 tons, 100,000 and 200,000-gallon tank and tower, Vallejo, Calif., to Chicago Bridge & Iron Co., Chicago.

PLATE CONTRACTS PENDING

Unstated tonnage, fifty-seven 515-gallon tanks, Civil Aeronautics Administration, Washington, inv. 1404; bids April 15.

Unstated tonnage, 300 16½-foot lengths, ⅜ and ¼-inch high carbon steel plate pipe, United States engineer, Philadelphia; Lancaster Iron Works, Lancaster, Pa., low, $40.89 per length, inv. 433.

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CONSTRUCTION and ENTERPRISE

Michigan

ANN ARBOR, MICH.—Douglas D. Loree, Ann Arbor architect, is preparing plans for factory addition here.

BENTON HARBOR, MICH.—Harbor Machine Co., 1091 Territorial road, has been organized to manufacture metal products. Ernest J. Trimble, 207 Hampton road, is correspondent.

DETROIT—Continental Aviation & Engineering Corp. will erect a 228 x 332-foot L-shaped addition to its plant on East Jefferson avenue. Giffels & Vallet Inc., 1000 Marquette building, architects. (Noted March 2).

DETROIT—Radius Tool & Die Co., 11363 Lumpkin, is having plans prepared by McGrath & Dohmen, architects, for factory addition.

DETROIT—Haberkorn-Barry Co. has been awarded general contract for construction of factory for Michigan Die Casting Co., 11831 Charlevoix.

DETROIT—City Pattern Works, 1161 Harper, has let contract for an addition to its factory to Atkin-Fordon Co., 13103 Monte Vista.

DETROIT—Barton-Malow Co., 1900 East Jefferson, has contract for alterations to factory of Copper & Brass Inc.

DETROIT—Star Cutter Co., 10040 Freeland, has been incorporated with $50,000 capital to manufacture tools and metal products. Howard B. Lawton, 16745 Edinborough avenue, is correspondent.

DETROIT—John B. Ebert has contract for alterations to Detroit plant of Rolls-Royce Inc.

DETROIT—Industrial Sheet Metal Co. has let contract to Klem Bros. for addition to factory.

FLINT, MICH.—Bids are being advertised for Flint's $280,000 water facilities improvement project. Work is expected to be started in June.

GRAND RAPIDS, MICH.—W. B. Jarvis Co. has been granted building permit for a $100,000 factory addition.

GRAND RAPIDS, MICH.—Grand Rapids Dowel Works plans erection of addition to its plant. Lenger Construction Co., Grand Rapids, has contract.

GRAND RAPIDS, MICH. — Robinson, Campau & Crowe, architects, are taking figures for factory addition here.

LANSING, MICH.—Reniger Construction Co., Lansing, has contract for construction of $20,000 addition to shop of Duplex Truck Co., Lansing.

LINCOLN PARK, MICH.—Lincoln Park Drop Forge Tool & Die Co. has been incorporated to manufacture tools and dies. Leo Garber, 1376 Grant avenue, is correspondent.

PONTIAC, MICH.—Wilson Foundry & Machine Co. has awarded contract to J. A. Fredman, Pontiac, for alterations to factory. L. J. Heenan, Pontiac, architect. (Noted April 6).

PORT HURON, MICH.—United Brass & Aluminum Co. has awarded contract to Ketels & Feil, Port Huron, for construction of foundry. Walter H. Wyeth, Port Huron, architect.

ROCHESTER, MICH.—Construction has been started here on an addition to plant of National Twist Drill & Tool Co.

Connecticut

SAUGATUCK, CONN.—Sealund Corp., 589 Riverside avenue, Westport, has let contract for research-assembly plant and office to T. H. Hrivnock, 54 Prescott street, Bridgeport, Conn. Cost $45,000. E. B. Caldwell and F. C. Anderson, 177 State street, Bridgeport, architects.

STAMFORD, CONN.—American Cyanamid Co., 30 Rockefeller Plaza, New York, will soon take bids on five-story 75 x 100-foot laboratory costing $170,000. Lockwood Greene Engineers Inc., 10 Rockefeller Plaza, New York, engineer.

STONINGTON, CONN.—Owner, care of L. F. Caproni, engineer, 1221 Chapel street, New Haven, Conn., will soon take bids on one-story 80 x 160-foot factory. Cost $45,000.

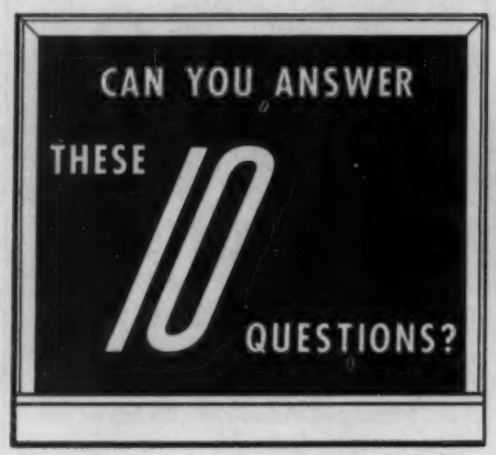
WALLINGFORD, CONN.—R. Wallace & Sons have let contract for one and two-story factory addition to C. F. Woodling Co., costing $40,000. Norton & Townsend, 405 Temple street, New Haven, Conn., architects.

Massachusetts

CHICOPEE, MASS.—Reda Mfg. Co., 165 Front street, has asked bids for one-story 60 x 150-foot plant, to cost $40,000 including equipment. H. J. Tessier, 220 Dwight street, Springfield, Mass., architect.

Rhode Island

PROVIDENCE, R. I.—Liberty Tool & Gauge Works Inc., 235 Georgia avenue, has let contract to C. I. Bigney Construction Co., 44 Franklin street,



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   A: A few of the benefits gained by concerns using Hackney special deep drawn shapes and shells are: improved product appearance . . . faster production . . . decreased over-all weight . . . increased strength . . . lower cost of an individual part . . . greater durability.
2. **Q:** *In what sizes are Hackney deep drawn shapes and shells manufactured?*
   A: They have been made as small as one quart and as large as 110 gallons.
3. **Q:** *From what metals can Hackney deep drawn shapes and shells be manufactured?*
   A: Hackney's deep drawn shapes and shells have been made in numerous metals (steel, stainless steel, monel-metal, nickel, aluminum, Herculoy, Everdur, bronze, copper, various alloys, etc.).
4. **Q:** *How is a Hackney deep drawn shape made?*
   A: Each shell is pressed and drawn from a solid circular sheet or plate of metal by means of high-pressure, hydraulic presses especially designed for this work.
5. **Q:** *What is this production method called?*
   A: Hackney's Special Cold-Drawing Process.
6. **Q:** *What are the advantages of this process?*
   A: It results in smooth finish, uniform thickness, and temper — elimination of laminations in the finished product — and usually provides lighter tare weight.
7. **Q:** *Who are using Hackney deep drawn shapes and shells?*
   A: Scores of manufacturers in many industries are increasing their product advantages by using Hackney facilities.
8. **Q:** *How can Hackney engineers help you?*
   A: By co-operating with you in developing new products or improving on those now being used.
9. **Q:** *What company is engaged in the manufacture of Hackney deep drawn shapes and shells?*
   A: Pressed Steel Tank Company. They have specialized in the manufacture of seamless deep drawn shells and shapes for more than 40 years.
10. **Q:** *What should be done to find out the full facts about Hackney's design and manufacturing facilities?*
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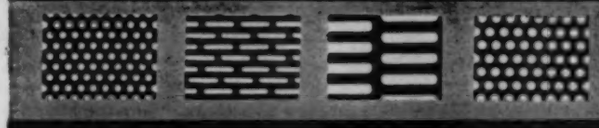

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WESTERLY, R. I.—C. B. Cottrell & Sons Co. has plans by Westcott & Mapes Inc., 139 Orange street, New Haven, for plant extension. Cost estimated at $40,000.

New York

BROOKLYN, N. Y.—Charles Fischer Spring Co., 234 Kent avenue, has plans by Morris Rothstein & Son, 391 Fulton street, for altering three-story factory. Cost $40,000.

JAMESTOWN, N. Y.—Rano Tool Co. Inc. has awarded contract for construction of an addition to its plant providing 16,000 square feet of space.

New Jersey

FORDS, N. J.—Heyden Chemical Co., has let contract for two-story 30 x 120-foot factory to Michael Riesz, 871 King George road. Estimated cost $40,000.

NEWARK, N. J.—Tung-Sol Lamp Works Inc., 95 Eighth avenue, has plans by Epple & Kahrs, architects and engineers, 15 Washington street, for factory.

RAHWAY, N. J.—Regina Corp., 54 West Cherry street, has awarded contract for factory addition to Miller Blyth Inc., 441 Lexington avenue, New York.

Ohio

CANTON, O.—D-N-X Engine Corp., a new company, is being incorporated through Attorney D. B. Day, of Lynch, Day, Pontius & Lynch, First National Bank building.

CLEVELAND—Cleveland Electric Illuminating Co., 45 Public Square, E. G. Crawford, president, and W. H. Hartman, purchasing agent, will start work at once on enlargement of Avon power plant. Estimated cost is $3,000,000, including equipment. (Noted Feb. 2.)

CLEVELAND—Lucas Machine Tool Co., H. M. Lucas, president, 523 East Ninety-ninth street, will build $55,000 extension of 13,500 square feet to factory.

CLEVELAND—Pal-Vin Machine & Mfg. Co., James Juliano, president and treasurer, will soon start 6500-square foot extension of factory space at 1419 East Fortieth street.

RAVENNA, O.—Chamberlain Engineering Co., Tallmadge, O., will manufacture and fabricate "Tygon," a new synthetic material used in processing equipment for refineries, arsenals, chemical and metallurgical plants, in the former Browning Foundry Co. plant here, which has been purchased by J. J. Chamberlain, president, Ravenna Ceramics Corp. The plant will be remodeled, and J. M. W. Chamberlain will be manager.

WARREN, O.—Lenney Machine & Mfg. Co., 733 Niles road Southeast, will soon start erection of an addition to its plant. C. B. Lenney is president.

WARREN, O.—Warren Tool Corp., Griswold street Northwest, will soon start work on 3200-square foot structure for additional manufacturing space and heat treating department.

Illinois

AURORA, ILL.—United Wall Paper Factories Inc. will build a $60,000 plant here.

CHICAGO—R. Krasberg & Sons Mfg. Co., 925 West Wrightwood avenue, will soon start construction of a $65,000 factory and office to provide a 50 per cent expansion of production. Some new equipment will be installed.

CHICAGO—Tri-Jay Tool Co., 4440 North Elston avenue, plans one-story 75 x 125-foot factory, and has let contract to Steigerwald Cement Construction Co., 5308 Northwest Highway. Estimated cost $40,000. S. Klefstad, 6324 Leggett avenue, architect and engineer.

CHICAGO—Ingersoll Steel & Disc Division of Borg-Warner Corp., 1000 West 120th street, has let contract for plant addition to Abell-Howe Co., 53 West Jackson boulevard. Estimated cost $150,000.

DEKALB, ILL.—Nehring Electric Works plans to spend about $40,000 for additions to its factory.

Indiana

RICHMOND, IND.—W. C. Shoemaker, city superintendent, plans erection of filter plant to cost $65,000.

Florida

MIAMI, FLA.—Miami Shipbuilding Corp. will build $1,200,000 shipbuilding plant here. T. C. Buhler, 1320 Venetian way, is president.

North Carolina

BURLINGTON, N. C.—H. Frank Mitchell Jr., Burlington, has contract for alterations and additions to manufacturing plant of Fairchild Engine & Airplane Corp. Albert Kahn Associated Architects & Engineers Inc., New Cen-

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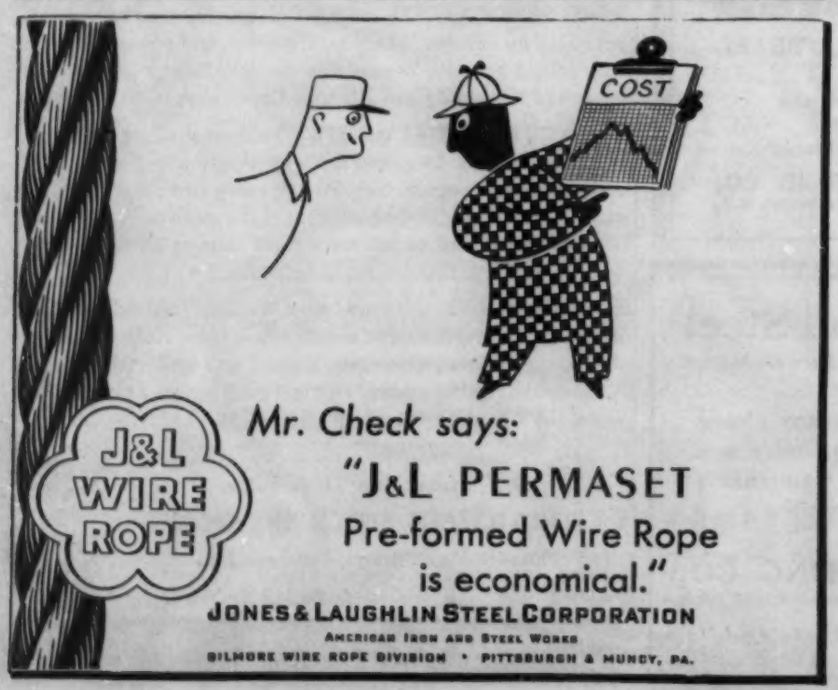

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ter building, Detroit, preparing plans.

CONCORD, N. C.—City, W. A. Wilkinson, mayor, receives bids April 28 for pumping station. Gilbert C. White Co., Durham, N. C., engineer.

Tennessee

MANCHESTER, TENN.—City, Thomas A. Johnson, Defense Public Works Project, will take bids April 30, Division B, sewage treatment plant with control house, primary and final clarifiers, high capacity rotary filter, etc. Walter L. Picton, engineer, 711 American Bank building, Nashville, Tenn.

Virginia

GLEN LYN, VA.—Appalachian Power Co. has let contract to George F. Hazelwood, Cumberland, Md., for structure to accommodate additional boilers and turbo-generators.

Missouri

ST. LOUIS—Woermann Construction Co., 3800 West Pine street, has contract for $40,000 factory at 4235 Clayton avenue for Mines Equipment Co., 1909 South Kingshighway.

Wisconsin

KENOSHA, WIS.—Holm Mfg. Co. plans one-story 30 x 170-foot factory addition. Contract awarded to Lindemann Construction Co., 4724 Fifth avenue. Estimated cost $40,000.

MILWAUKEE—Globe Steel Tubes Co., 3801 West Burnham street, has given general contract for one-story 120 x 350-foot addition to Gebhard-Berghammer Inc., 5420 West State street.

Texas

PORT ARTHUR, TEX.—Neches Butadiene Products Co., organized by Gulf Oil Corp., Texas Co., Atlantic Refining Co., Pure Oil Co., and Magnolia Petroleum Co., will erect a $40,000,000 plant in this area to produce butadiene.

RUSK, TEX.—Christopher Iron & Chemical Corp., care of J. I. Perkins, Rusk, is considering erection of iron ore plant here, costing over $3,000,000. McGrossin & Co., 120 Wall street, New York, engineer, is surveying ore and water facilities.

Iowa

DAVENPORT, IOWA—Uchtorff Co., A. F. Uchtorff, president, 211 North Howell street, plans factory additions costing $40,000.

California

LOS ANGELES—Caso Mfg. Co. will erect machine shop at 832 East Sixtieth street, 50 x 140 feet, to cost $10,000.

LOS ANGELES—Neubart Stamping Co. will erect factory at 120 West Slauson avenue, 75 x 103 feet, to cost $10,800.

LOS ANGELES—A warehouse will be erected at 2500 East Twenty-fourth street, for Western Iron & Metal Co. The structure will cover an area 118 x 153 feet and will cost $20,000.

Washington

CENTRALIA, WASH.—F. D. McLaughlin, president, George Auto Train Control Co., manufacturer of mechanical control devices for railroads, announces conversion of plant with $50,000 advanced by WPB.

SEATTLE—Barbee Marine Works Inc., 2601 Market street, has awarded contract for addition to machine shop.

VANCOUVER, WASH.—Kaiser Co. has awarded contract to George H. Buckler Co., Portland, Oreg., to construct dormitory at local shipyard, and contract to Wegman & Son, Portland, to build $140,000 forge and machine shop.

Canada

FORT WILLIAM, ONT.—Canadian Car & Foundry Co. Ltd., 621 Craig street West, Montreal, has given general contract to Barnett McQueen Co. Ltd., 460 Christina street, for addition to shipyard No. 7 here at cost of approximately $100,000. L. J. Soulsby is local manager. C. D. Howe Co. Ltd., Public Utilities building, Port Arthur, consulting engineers.

HAMILTON, ONT.—Toronto, Hamilton & Buffalo Railway Co., Aberdeen avenue, has received bids and will award contracts immediately for car repair plant here to replace plant recently destroyed by fire.

HAMILTON, ONT.—Barber Die & Casting Co. Ltd., 68 Sanford avenue North, is having plans prepared by Prack & Prack, architects, Pigott building, for one-story plant addition to cost about $50,000.

HAMILTON, ONT.—H. Bernard Stamp & Stencil Co., 24 Gore avenue, will award contract immediately for rebuilding plant here, to cost about $60,000, with equipment.

HAMILTON, ONT.—Union Drawn Steel Co., 2 Weber street, has given general contract to Pigott Construction Co. Ltd., Pigott building, and construction work will be started at once on plant addition to cost about $100,000 with equipment.

LONDON, ONT.—Sparton of Canada Ltd., 100 Elm street, is taking bids for further plant addition to cost about $50,000. G. A. Holmes is secretary and manager.

ST. CATHARINES, ONT. — Foster Wheeler Ltd., 81 Eastchester street, is taking bids for addition to boiler shop, 110 x 160 feet, to cost about $60,000, with equipment.

ST. CATHARINES, ONT.—McKinnon Industries Ltd., Ontario street, is having plans prepared by A. E. Nicholson, 46 Queen street, for addition to plant here to cost about $40,000.

TORONTO, ONT.—Peerless Engineering Ltd., 11 Charlotte street, is considering plans for plant here to cost about $240,000, with equipment.

TORONTO, ONT.—International Business Machines Ltd., 36 King street East, has given general contract to Dickie Construction Co. Ltd., 17 Yorkville avenue, for plant addition to cost $10,000. Plans prepared by Harkness & Hertzberg, engineers, 57 Bloor street West.

TORONTO, ONT.—Ferranti Electric Ltd. is receiving bids through Ewart, Armer & Byam, engineers, 36 Toronto street, for plant addition to cost about $50,000, with equipment.

WINDSOR, ONT.—Advance Machine & Tool Co., 1164 Albert road, has received bids and will soon let contracts for plant to cost, with equipment, about $30,000. Sheppard & Masson, 52 Chatham street West, architects.

WINDSOR, ONT. — Dominion Forge & Stamping Co. Ltd., Seminole road, has given general contract to Allan Construction Co. Ltd., 44 Wyandotte street East, for erection of plant addition to cost $85,000, including equipment.

WINDSOR, ONT.—Department of Munitions and Supply, Ottawa, C. D. Howe, minister, will erect plant here for manufacture of cutting tools, to cost $500,000, with equipment.

HALIFAX, N. S.—Nova Scotia Light & Power Co. Ltd., Barrington street, J. B. Hayes, general manager, is having plans prepared by C. St. J. Wilson, Roy building, for steam electric power plant on Water street, to cost $65,000.

MONTREAL, QUE.—Canadian Vickers Ltd., 1536 Notre Dame street East, is having plans prepared by T. Pringle & Son Ltd., 485 McGill street, for plant addition to cost about $250,000.

MONTREAL, QUE.—Montreal Locomotive Works Ltd., 215 St. James street West, has received bids and will soon place contracts for plant additions, 70 x 480 feet and 60 x 400 feet, respectively, at the Longue Pointe works, and bids will be called early in May for another extension to the company's works here. T. Pringle & Son Ltd., 485 McGill street, engineer.

QUEBEC, QUE.—Department of Munitions and Supply, Ottawa, H. H. Turnbull, secretary, has given general contract to Anglin-Norcross, Quebec Ltd., 892 Sherbrooke street West Montreal, for addition to foundry here to cost about $500,000, including equipment.

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ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

	Page
A	
Abrasive Co.	—
Acheson Colloids Corp.	—
Acme Galvanizing Corp.	—
Acme Steel & Malleable Iron Works	—
Ahlberg Bearing Co.	—
Air Reduction	—
Ajax Electrothermic Corp.	13
Alan Wood Steel Co.	—
Allegheny Ludlum Steel Corp.	—
Allen-Bradley Co.	—
Alliance Machine Co.	—
Allis-Chalmers Mfg. Co.	—
Alrose Chemical Co.	—
American Agile Corp.	—
American Air Filter Co., Inc.	—
American Brass Co., The	—
American Bridge Co.	22
American Broach & Machine Co.	—
American Cable Division of American Chain & Cable Co., Inc.	—
American Chain & Cable Co., Inc., American Cable Division	—
American Chain & Cable Co., Inc., American Chain Division	—
American Chain & Cable Co., Inc., Ford Chain Block Division	137
American Chain & Cable Co., Inc., Page Steel & Wire Division	—
American Chain Division of American Chain & Cable Co., Inc.	—
American Chemical Paint Co.	—
American Engineering Co.	—
American Foundry Equipment Co.	104
American Gas Association	—
American Hard Rubber Co.	—
American Hot Dip Galvanizers Association	—
American Lanolin Corp.	—
American Metal Hose Branch of The American Brass Co.	—
American Metal Products Co.	108
American Monorail Co.	—
American Nickeloid Co.	141
American Pulverizer Co.	112
American Roller Bearing Co.	—
American Rolling Mill Co., The	102
American Screw Co.	20, 21
American Shear Knife Co.	—
American Steel & Wire Co.	—
American Tinning & Galvanizing Co.	—
Ampco Metal, Inc.	—
Amsler-Morton Co., The	—
Andrews Steel Co., The	—
Apollo Steel Co.	—
Armstrong-Blum Mfg. Co.	—
Atkins, E. C., & Co.	—
Atlantic Stamping Co.	—
Atlantic Steel Co.	—
Atlas Car & Mfg. Co.	—
Atlas Drop Forge Co.	141
Atlas Lumnite Cement Co.	—
B	
Babcock & Wilcox Co.	—
Bailey, Wm. M., Co.	89
Baker-Raulang Co.	—
Baldwin Southwark Division, The Baldwin Locomotive Works	—
Bantam Bearings Corp.	—
Barnes, Wallace, Co., Division of Associated Spring Corporation	—
Basic Refractories, Inc.	—
Bay City Forge Co.	—
Bay State Abrasive Products Co.	—
Bellis Heat Treating Co.	—
Belmont Iron Works	141
Berger Manufacturing Div., Republic Steel Corp.	—
Berkeley Equipment Co.	—
Bethlehem Steel Co.	1
Birdsboro Steel Foundry & Machine Co.	—
Bissett Steel Co., The	134
Blanchard Machine Co.	—
Blaw-Knox Co.	30
Blaw-Knox Division, Blaw-Knox Co.	—
Bliss & Laughlin, Inc.	—
Bloom Engineering Co.	—
Bridgeport Brass Co.	—
Bristol Co., The	—
Brooke, E. & G., Iron Co.	—
Brosius, Edgar E., Co.	127
Brown & Sharpe Mfg. Co.	—
Brown Instrument Co., The	—
Bryant Chucking Grinder Co.	—
Bryant Machinery & Engineering Co.	—
Buffalo Galvanizing & Tinning Works	—
Bullard Co., The	—
Bundy Tubing Co.	—
C	
Cadman, A. W., Mfg. Co.	129
Carborundum Co., The	—
Carey, Philip, Mfg. Co., The	—
Carnegie-Illinois Steel Corp.	26, 27
Carpenter Steel Co., The	77
Carter Hotel	—
Cattie, Joseph P., & Bros., Inc.	141
Ceilcote Co., The	—
Central Screw Co.	—
Chambersburg Engineering Co.	—
Chandler Products Corp.	—
Chicago Metal Hose Corp.	—
Chicago Perforating Co.	—
Chicago Rawhide Mfg. Co.	8
Cincinnati Grinders, Inc.	—
Cincinnati Milling Machine Co.	—
Cincinnati Shaper Co., The	2
Clark Controller Co.	—
Cleereman Machine Tool Co.	—
Cleveland Automatic Machine Co.	87
Cleveland Cap Screw Co.	—
Cleveland-Cliffs Iron Co.	—
Cleveland Crane & Engineering Co.	29
Cleveland Hotel	—
Cleveland Punch & Shear Works Co.	—
Cleveland Tramrail Division, Cleveland Crane & Engineering Co.	—
Cleveland Twist Drill Co., The	—
Cleveland Worm & Gear Co., The	—
Climax Molybdenum Co.	—
Clinton Bridge Works	—
Cold Metal Products Co.	—
Colonial Broach Co.	—
Columbia Steel Co.	22, 26, 27
Columbus Die, Tool & Machine Co.	—
Commercial Metals Treating, Inc.	—
Cone Automatic Machine Co., Inc.	—
Continental Machines, Inc.	10, 11
Continental Roll & Steel Foundry Co.	—
Continental Screw Co.	—
Continental Steel Corp.	—
Cooper-Bessemer Corp.	—
Copperweld Steel Co.	—
Corbin Screw Corp.	—
C-O-Two Fire Equipment Co.	—
Cowles Tool Co.	—
Crane Co.	—
Crawbuck, John D., Co.	—
Crosby Co., The	141
Cuban-American Manganese Corp.	—
Cullen-Friestedt Co.	—
Culvert Division, Republic Steel Corp.	—
Cunningham, M. E., Co.	—
Curtis Pneumatic Machinery Division of Curtis Manufacturing Company	101
Cutler-Hammer, Inc.	—
D	
Darwin & Milner, Inc.	—
Davis Brake Beam Co.	—
Dearborn Gage Co.	117
Denison Engineering Co., The	Inside Back Cover
DeSanno, A. P., & Son, Inc.	—
Detroit Electric Furnace Division, Kuhlman Electric Co.	—
Detroit Leland Hotel	—
Diamond Expansion Bolt Co., Inc.	—
Diamond Tool Co.	—
Dietert, Harry W., Co.	—
Disston, Henry, & Sons, Inc.	—
Dow Chemical Co., The	—
Downs Crane & Hoist Co.	—
Dravo Corp., Engineering Works Div.	—
Dravo Corp., Machinery Div.	—
Duffin Iron Co.	—
E	
Easton Car & Construction Co.	—
Economy Engineering Co.	106
Edison Storage Battery Div. of Thomas A. Edison, Inc.	—
Elastic Stop Nut Corp.	—
Electric Controller & Mfg. Co.	Inside Front Cover
Electric Furnace Co., The	—
Electric Storage Battery Co.	—
Electro Alloys Co., The	—
Electro Metallurgical Co.	—
Enterprise Galvanizing Co.	141
Equipment Steel Products Division of Union Asbestos & Rubber Co.	—
Erdle Perforating Co., The	137
Erie Forge Co.	—
Erie Foundry Co.	—
Euclid Crane & Hoist Co.	100
Eureka Fire Brick Works	—
Ex-Cell-O Corp.	34
F	
Fafnir Bearing Co., The	—
Fairbanks, Morse & Co.	32
Fanner Mfg. Co.	—
Farquhar, A. B., Co., Ltd.	—
Farval Corp., The	—
Ferracute Machine Co.	—
Fidelity Machine Co.	—
Finn, John, Metal Works	—
Firth Sterling Steel Co.	141
Fitchburg Grinding Machine Corp.	—
Fitzsimons Co., The	128
Ford Chain Block Division of American Chain & Cable Co., Inc.	137
Foster, L. B., Co., Inc.	142
Four V Structural Steel Companies	—
Foxboro Co., The	114
Frantz, S. G., Co., Inc.	—
Fuller Brush Co.	—
G	
Gage Structural Steel Co.	—
Galland-Henning Mfg. Co.	—
Galvanizers, Inc.	—
Garrett, Geo. K., Co.	—
General Abrasive Co., Inc.	—
General American Transportation Corp.	—
General Blower Co.	142
General Electric Co.	—
Gisholt Machine Co.	17
Globe Brick Co., The	—
Granite City Steel Co.	—
Grant Gear Works	—
Graver Tank & Mfg. Co., Inc.	135
Graybar Electric Co.	—
Great Lakes Steel Corp.	14
Greenfield Tap & Die Corp.	31
Gregory, Thomas, Galvanizing Works	—
Grinnell Co., Inc.	—
Gruendler Crusher & Pulverizer Co.	—
H	
Hagan, George J., Co.	—
Hallden Machine Co., The	138
Hanlon-Gregory Galvanizing Co.	—
Hanna Engineering Works	—
Hanna Furnace Corp.	—
Hanniffin Mfg. Co.	132
Harbison-Walker Refractories Co.	—
Harnischfeger Corp.	28
Harper, H. M., Co., The	—
Harrington & King Perforating Co.	137
Hassall, John, Inc.	135
Hays Corp., The	—
Heald Machine Co.	—
Heppenstall Co.	6
Hevi Duty Electric Co.	—
Hill, James, Mfg. Co.	—
Hindley Mfg. Co.	139
Hobart Bros. Co.	139
Homestead Valve Mfg. Co.	—
Horsburgh & Scott Co.	125
Hubbard & Co.	—
Hubbard, M. D., Spring Co.	—
Huther Bros. Saw Mfg. Co.	—
Hyatt Bearings Division, General Motors Corporation	—
Hyde Park Foundry & Machine Co.	—
I	
Ideal Commutator Dresser Co.	—
Illinois Clay Products Co.	—
Independent Galvanizing Co.	—
Industrial Brownhoist Corp.	—
Ingersoll Steel & Disc Division, Borg-Warner Corp.	—
Inland Steel Co.	126
International Nickel Co., Inc.	16
International Screw Co.	—
International-Stacey Corp.	—
Iron & Steel Products, Inc.	142
Isaacson Iron Works	—
J	
Jackson Iron & Steel Co., The	141
James, D. O., Mfg. Co.	—
J-B Engineering Sales Co.	—
Jessop Steel Co.	—
Jessop, Wm., & Sons, Inc.	—
Johns-Manville Corp.	—
Johnson Bronze Co.	—
Johnson Steel & Wire Co., Inc.	—
Jones & Lamson Machine Co.	50, 51
Jones & Laughlin Steel Corp.	138
Jones, W. A., Foundry & Machine Co.	—
Joslyn Mfg. & Supply Co.	—
Joslyn Co. of California	—

◆ ◆ ADVERTISING INDEX ◆ ◆

Where-to-Buy Products Index carried in first issue of month.

Page

K

Kardong Brothers, Inc. — Kearney & Trecker Corp. — Kemp, C. M., Mfg. Co. 110 Kester Solder Co. 139 Kidde, Walter, & Co., Inc. — King Fifth Wheel Co. — Kinnear Mfg. Co. 107 Kirk & Blum Mfg. Co. 143 Koppers Co. — Koven, L. O., & Brother, Inc. — Kron Co., The —

L

Lake City Malleable Co. — Lakeside Steel Improvement Co., The 132 Lamson & Sessions Co., The — Landis Machine Co. — Lang Machinery Co. 142 La Salle Steel Co. — Latrobe Electric Steel Co. — Layne & Bowler, Inc. — LeBlond, R. K., Machine Tool Co., The Back Cover Leeds & Northrup Co. — Lee Spring Co., Inc. 140 Lehigh Structural Steel Co. — Leschen, A., & Sons Rope Co. — Levinson Steel Co., The — Levinson Steel Sales Co. — Lewin-Mathes Co. — Lewis Bolt & Nut Co. — Lewis Foundry & Machine Division of Blaw-Knox Co. 30 Lewis Machine Co., The 141 Lincoln Electric Co., The — Lincoln Hotel — Linde Air Products Co., The — Link-Belt Co. — Logemann Bros. Co. — Lovejoy Flexible Coupling Co. 137 Lubriplate Division Fiske Brothers Refining Co. — Lyon Metal Products, Inc. —

Mc

McKay Machine Co. 3 McKee, Arthur G., Co. — McKenna Metals Co. —

M

MacDermid, Inc. — Mackintosh-Hemphill Co. 113 Macklin Co. — Macwhyte Co. — Maehler, Paul, Co., The — Mahr Manufacturing Co. — Mallory, P. R., & Co., Inc. — Mathews Conveyer Co. — Matthews, Jas. H., & Co. — Maurath, Inc. 18 Mercury Mfg. Co. 109 Mesta Machine Co. — Metal & Thermit Corporation 111 Michiana Products Corp. — Micromatic Hone Corp. — Midland Structural Steel Co. — Midvale Co., The — Missouri Rolling Mill Corp. — Moltrup Steel Products Co. — Molybdenum Corporation of America — Monarch Machine Tool Co., The — Monarch Steel Co. 128 Morgan Construction Co. — Morgan Engineering Co. — Morton Salt Co. — Motch & Merryweather Machinery Co. — Motor Repair & Mfg. Co. 142

N

National Acme Co. 118 National Automatic Tool Co., Inc. — National Bearing Metals Corp. — National Broach & Machine Co. — National Carbon Co., Inc., Carbon Sales Division — National Cylinder Gas Co. — National-Erie Corp. — National Lead Co. — National Roll & Foundry Co. — National Screw & Mfg. Co. — National Steel Corp. 14 National Telephone Supply Co., Inc. — National Tube Co. — New Departure, Division General Motors Corp. — New England Screw Co. — New Jersey Zinc Co. 79 New York & New Jersey Lubricant Co. — Niagara Machine & Tool Works —

Page

Niles Steel Products Div., Republic Steel Corp. — Nilson, A. H., Machine Co. 143 Nitralloy Corp., The — Norma-Hoffmann Bearings Corp. — Northwest Engineering Co. — Norton Co., The —

O

Ohio Crankshaft Co. 56 Ohio Electric Mfg. Co. — Ohio Galvanizing & Mfg. Co. — Ohio Knife Co., The 133 Ohio Locomotive Crane Co., The 139 Ohio Seamless Tube Co., The 91 Ohio Steel Foundry Co., The — Oliver Iron & Steel Corp. — O'Neil-Irwin Mfg. Co. — Orr & Sembower, Inc. — Oster Mfg. Co., The —

P

Page Steel & Wire Division American Chain & Cable Co., Inc. — Pangborn Corp. — Parker, Charles, Co. — Parker-Kalon Corp. — Parkin, William M., Co. — Pawtucket Screw Co. — Penn Galvanizing Co. — Pennsylvania Industrial Engineers 139 Pennsylvania Salt Mfg. Co. 95 Perkins, B. F., & Son, Inc. — Pheoll Mfg. Co. — Philadelphia Gear Works — Phoenix Mfg. Co. — Pike, E. W., & Co. — Pittsburgh Crushed Steel Co. 141 Pittsburgher Hotel, The — Pittsburgh Gear & Machine Co. — Pittsburgh Lectromelt Furnace Corp. — Pittsburgh Rolls Division of Blaw-Knox Co. — Pittsburgh Tool Steel Wire Co. 85 Plymouth Locomotive Works Division of The Fate-Root-Heath Co. — Poole Foundry & Machine Co. — Porter, H. K., Co., Inc. — Pressed Steel Tank Co. 136

R

Racine Tool & Machine Co. — Ransohoff, N., Inc. — Raymond Mfg. Co., Division of Associated Spring Corp. — Reading Chain & Block Corp. 116 Ready-Power Co. — Reliance Electric & Engineering Co. — Republic Steel Corp. 7 Revere Copper and Brass, Inc. — Rhoades, R. W., Metaline Co., Inc. — Riverside Foundry & Galvanizing Co. — Robertson, H. H., Co. — Roebling's, John A., Sons Co. 103 Rollway Bearing Co., Inc. — Roper, George D., Corp. 97 Ruemelin Mfg. Co. — Russell, Burdsall & Ward Bolt & Nut Co. — Ryerson, Joseph T., & Son, Inc. 36

S

Sadonia Ltd. 139 Salem Engineering Co. — Samuel, Frank, & Co., Inc. — San Francisco Galvanizing Works — Sanitary Tinning Co., The — Scaife Co. 130 Schloemann Engineering Corp. — Scovill Mfg. Co. — Scully Steel Products Co. — Sellers, Wm., & Co., Inc. — Seymour Manufacturing Co., The 23 Shakeproof, Inc. — Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc. — Sheffield Corp., The — Shell Oil Co., Inc. 24 Shenango Furnace Co., The — Shenango-Penn Mold Co. — Shepard Niles Crane & Hoist Corp. — Shuster, F. B., Co., The — Silent Hoist Winch & Crane Co. — Simonds Gear & Mfg. Co. 135 Simonds Saw & Steel Co. — SisalKraft Co., The 83 SKF Industries, Inc. — Smith Oil & Refining Co. — Snyder, W. P., & Co. — Socony-Vacuum Oil Co., Inc. — South Bend Lathe Works —

Page

Southington Hardware Mfg. Co. — Standard Galvanizing Co. — Standard Steel Works 105 Stanley Works, The — Steel & Tubes Division, Republic Steel Corp. 7 Steel Founders' Society of America — Steelweld Machinery Division, Cleveland Crane & Engineering Co. 29 Sterling Grinding Wheel Div. of The Cleveland Quarries Co. — Streine Tool & Manufacturing Co., The 59 Strom Steel Ball Co. — Strong Steel Foundry Co. — Stuart, D. A., Oil Co. 115 Sturtevant, B. F., Co. — Sun Oil Co. — Superior Steel Corp. — Surface Combustion Corp. — Sutton Engineering Co. — Swindell-Dressler Corp. 15

T

Taylor-Wilson Mfg. Co. 139 Tennessee Coal, Iron & Railroad Co. — Thomas Machine Mfg. Co. — Thomas Steel Co., The — Thompson-Bremer & Co. 92 Tide Water Associated Oil Co. — Timken Roller Bearing Co. — Timken Steel & Tube Division, The Timken Roller Bearing Co. — Tinnerman Products, Inc. — Titanium Alloy Manufacturing Co. 12 Toledo Stamping & Mfg. Co. — Tomkins-Johnson Co., The — Torit Manufacturing Company — Torrington Co., The — Truscon Steel Co. —

U

Udylite Corp., The — Union Carbide & Carbon Corp. — Union Drawn Steel Div., Republic Steel Corp. — Union Steel Products Co. — United Chromium, Inc. 9 United Engineering & Foundry Co. — United States Graphite Co. — United States Steel Corp., Subsidiaries 22, 26, 27 United States Steel Export Co. 22, 26, 27

V

Valley Mould & Iron Corp. — Vanadium-Alloys Steel Co. — Vanadium Corporation of America 25 Van Dorn Iron Works Co., The — Vaughn Machinery Co., The — Veeder-Root, Inc. —

W

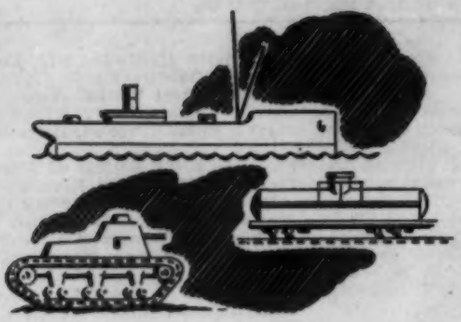
Waldron, John, Corp. 137 Walker-Turner Co., Inc. — Wall-Colmonoy Corp. — Warner & Swasey Co. 5 Washburn Wire Co. — Watson-Stillman Co., The — Wayne Chemical Products Co. — Wean Engineering Co., Inc. 19 Webb City and Carterville Foundry and Machine Works — Weinman Pump & Supply Co., The — Weirton Steel Co. — Welding Equipment & Supply Co. — Wellman Bronze & Aluminum Co. — Wellman Engineering Co. 135 Westinghouse Electric & Mfg. Co. 146 West Penn Machinery Co. — West Steel Casting Co. 141 Wheeling Steel Corporation — Whitcomb Locomotive Co., The — Whitehead Stamping Co. 141 Whitney Screw Corp. — Wickwire Brothers, Inc. — Wilcox, Crittenden & Co., Inc. — Williams, J. H., & Co. — Wilson, Lee, Engineering Co. — Witt Cornice Co., The — Wood, R. D., Co. — Worth Steel Co. Front Cover Wyckoff Drawn Steel Co. —

Y

Yale & Towne Mfg. Co. — Yoder Co., The — Youngstown Alloy Casting Corp. — Youngstown Sheet & Tube Co., The 81

Z

Zeh & Hahnemann Co. 133



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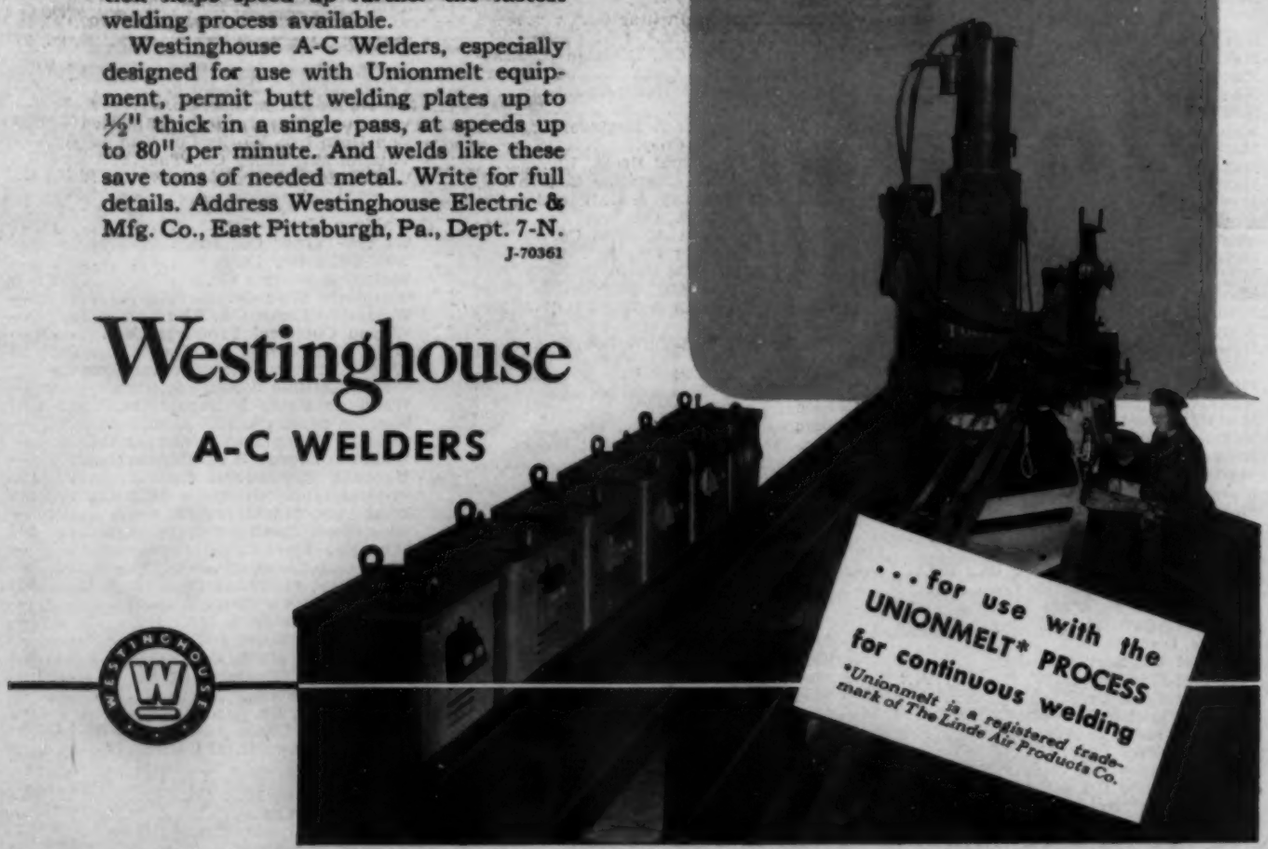
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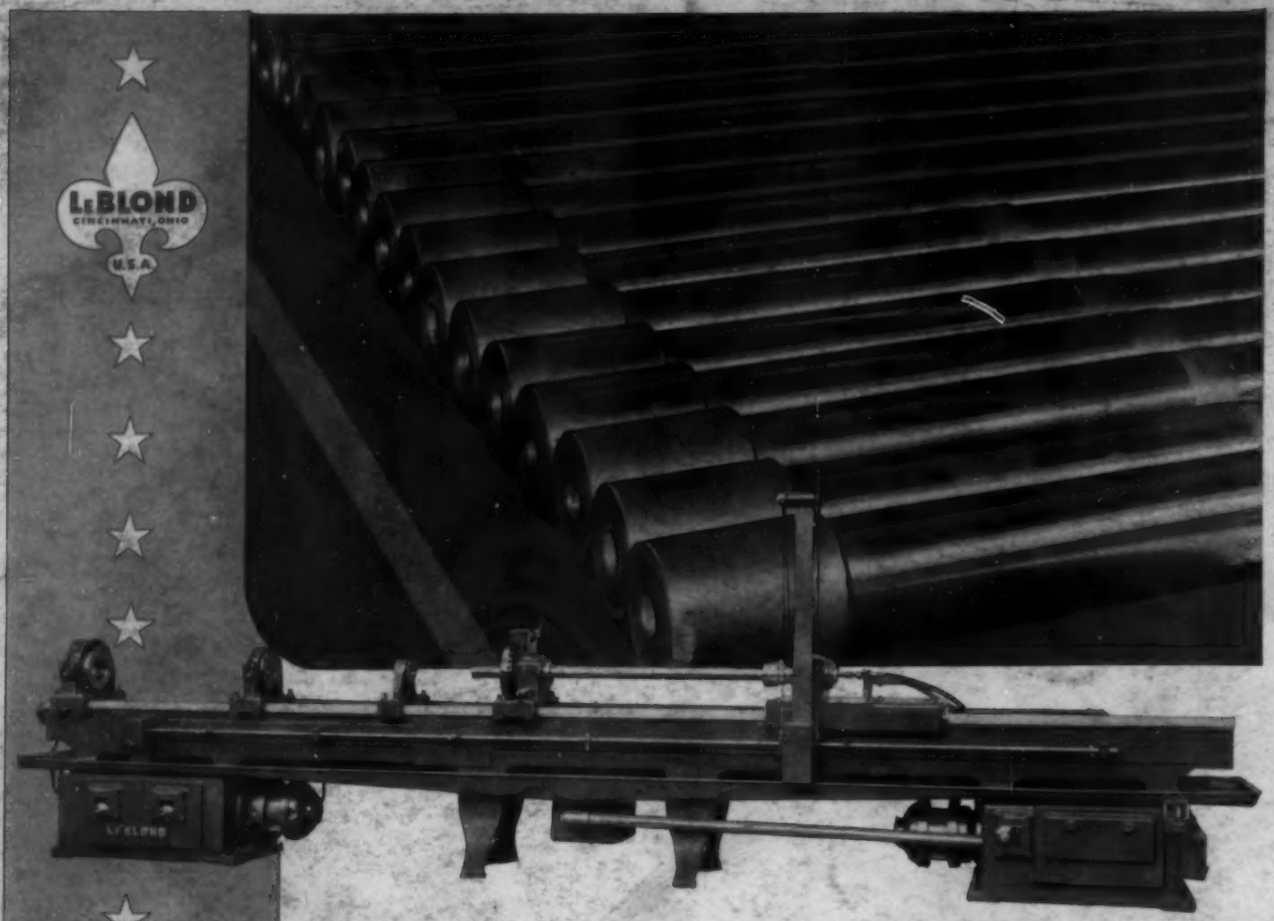

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CONTENTS

Index of WPB and OPA Orders 2
Digest of Priorities and Allocations Orders 3
Index of Allocation and Preference Order Forms 16
Digest of Price Schedules 17
War Production Board 22
Office of Price Administration 25
OPA Regional Offices 25
Contract Field Offices 26
Priorities Field Offices 27

Inasmuch as changes constantly are being made in priorities, allocations and price rulings, readers should consult each issue of STEEL for news of such changes. Such news will be found under the head of "Priorities, Allocations, Prices".

Please see Page 16 for information as to forms that may be obtained from STEEL's Readers Service Department at nominal prices.

—The Editors

INDEX OF WPB AND OPA ORDERS

Subject	Order Number

"P" ORDERS

Airframes	P-3
a. Curtiss Wright	P-13
Aircraft Accessories	P-52
Aircraft Engines & Propellers	P-4
Aircraft Products	P-109, P-122
Air Transportation Facilities	P-47
Aluminum Scrap	P-12
Aluminum Plant Maintenance	P-120
Arc Welding & Resistance Welding Machines	P-39
Automobile Replacement Parts	P-57
Blind Made Products	P-82
Bombers	P-9a, b, c, d, e, f
Bookbinding Wire	P-101
Canning Machinery & Equipment	P-17
Maintenance & Repair	P-42
American Can Co.	P-42a
Food Machinery Corp.	P-51
Canning Plant Maintenance	P-115
Chemical Plants	P-89
Containers:	
Steel	P-76
Non-metal (Steel used in)	P-79
Conveyor Machinery	P-78
Copper & Copper-base Alloy scrap	P-61
Copper, Brass Mill Maintenance	P-106
Cranes	P-1
Cutting Tool Equipment	P-18, E-2
Defense Projects:	
Publicly Financed	P-19c
Privately Financed	P-19d
Pan-American Airways	P-41
Outside U. S.	P-19
Limited to Critical List	P-19a
Protected Delivery Date (Dow Chemical and B. F. Goodrich)	P-19b
Road projects for defense	P-19e
Electrical Relays & Solenoid Assemblies	P-15
Experimental Research Work	P-24
Elevator & Escalator Repair Parts	P-72
Explosives (Industrial)	P-86
Farm Machinery & Equipment	P-95
Fire-Fighting Apparatus	P-45, P-45a
Fire Protective Equipment	P-108
Foundry Equip. & Repair Parts	P-31
Freight car construction	P-8
Health Supplies	P-29
Heat-Treating Furnaces	P-74
Housing (private)	P-71
Housing (defense)	P-19d, P-19g, P-55
Insecticides, Germicides, Fungicides	P-87
Laboratory Equipment & Reagent Chemicals	P-62
Locomotives:	
Repair & Rebuilding	P-21
Specified new construction	P-20
Machine Tools:	
Production of	P-11a
Rebuilding of	P-77
Maintenance & Repairs	P-100
Magnesium Plant Maintenance	P-120
Metalworking Equipment	P-11a
Mines:	
Maintenance & Repair	P-56
Mining Mach. & Equip.	P-56a
South American Mines	P-58
Motor Truck Parts	P-107
Osnaburg	P-116
Paints (Marine)	P-65
Petroleum Refinery (British)	P-103
Petroleum (Supplies for)	P-83, 98, 98-a
Plates, Welding Electrodes	P-92
Plumbing, Heating Repairs	P-84
Production Requirements Plan	P-90
Radio Equipment	P-16
Radiosondes	P-38
Railroad Material	P-88
Remodeling Projects	P-110
Research Laboratory Supplies	P-43
Resistance Welding Alloy Electrodes	P-85
Ships:	
Conversion of	P-10
Merchant ship construction	P-7
Ship Ways	P-14a, b
Steel Plant Maintenance	P-68
Tackle Blocks	P-75
Tanks (Light)	P-25a, b, c, d, e
Tanks (Medium)	P-26a, b, c, d, e
Textile Machinery & Equipment	P-53
Trucks:	
Heavy Trucks, Trailers, Buses	P-54
Industrial Lift	P-40
Light trucks	P-57
Utilities (Maint. & Repair)	P-46
Vehicles (Half-track)	P-35

"M" ORDERS

Agave Fiber	M-84
Alcohol (Ethyl)	M-30
Alcohol (Methyl)	M-31
Aluminum	M-1d, f
Aluminum Pigment, Paint	M-1-g
Antimony	M-112
Asbestos	M-79, 123
Bearings (jewel)	M-50
Boxes (Canners', Canmakers')	M-113
Bristles	M-51, a
Burlap	M-47
Cadmium	M-65, a
Calcium Silicon	M-20
Cashew Nut Shell Oil	M-66
Chlorine	M-19
Clothing (Men's, Boys')	M-73a
Chromium	M-18a
Closures	M-104
Closures, Rubber Sealed	M-119
Coal, Coke Inventories	M-97
Cobalt	M-39, b
Copper:	
Distribution	M-9
Copper, Copper-alloy scrap	M-9b
Conservation order	M-9c
In Jewelry	M-9-c-2
In Shoes	M-9-c-1
In Printing	M-9-c-3
Cork	M-8, M-8a
Cotton Bags	M-107
Cotton Duck	M-91
Corundum	M-89
Cotton Linters	M-12
Cotton Seed	M-92
Diamonds (Rough)	M-109
Diphenylamine	M-75
Dyestuffs	M-103
Electrical Supplies	M-67
Enamel (For Cans, Closures)	M-108, 116
Formaldehye	M-25
Fats and Oils	M-71
Feathers (Goose, Duck)	M-102
Glycerine	M-58
Graphite (Madagascar Flake)	M-61
Heating Supplies	M-67
Hemp Seed	M-82
Hexamethylenetetramine	M-25
Hydrocarbon Refrigerants	M-28
Hydrocarbon Solvents	M-41
Imports (Strategic Materials)	M-63
Ink (Printing)	M-53
Iridium	M-49
Iron & Steel Scrap	M-24
Jute	M-70
Kapok	M-85
Lauric Acid Oil	M-60
Lead	M-38, c
Lead (Scrap)	M-72
Leather (Sole)	M-80
Magnesium	M-2
Manila Cordage, Fiber	M-36
Mercury	M-78
Mica	M-101
Mining Machinery	M-63
Molasses	M-54
Molybdenum	M-110
Neoprene	M-4
Nickel (Primary)	M-6, M-6-b
Oil Industry Materials	M-68, c
Olive Drab Clips, Rags, Wastes	M-87
Palm Oil	M-59
Paraformaldehyde	M-25
Phenol	M-27
Phosphorous Oxychloride	M-35
Pig Iron	M-17
Plumbing Supplies	M-67
Polyvinyl Chloride	M-10
Potassium Perchlorate	M-32
Potassium Permanganate	M-33
Quinine	M-131
Rapeseed Oil	M-77
Rayon Yarn	M-37
Rhodium	M-95
Rotenone	M-133
Rubber:	
Distribution of	M-15
Use Restricted	M-15b
Chlorinated Rubber	M-46
Synthetic Rubber	M-13
Shearlings	M-94
Shellac	M-106
Silk	M-22
Silk Waste	M-26
Skins	M-114
Sodium Nitrate	M-62
Sperm Oil	M-40
Spirits (distilled)	M-69
Sponges	M-125
Steel:	
For drums	M-45, P-76
To Direct Distribution	M-21
Alloy Steel, Iron, Wrought	M-21a
High Chromium	M-21d
Nickel-bearing	M-21a
Plates	M-21c
Shot and Bullet Core	M-21f
Warehouse	M-21b
Tubes (Collapsible)	M-115
Waste Paper	M-129
Sugar	M-55, M-98
Sulphite Pulp	M-52
Synthetic Resins	M-25
Tea	M-111
Teak	M-83
Terne Plate	M-21e, M-81
Tin	M-43, 43a
Tin (Scrap)	M-72
Tin Plate	M-21e, M-81
Titanium Pigments	M-44
Toluene	M-34
Tricresyl Phosphate	M-16
Trucks (Motor)	M-100
Tung Oil	M-57
Tungsten:	
Distribution of	M-29
In High-speed Steel	M-14
Vanadium	M-23
Wool	M-73
Wood Pulp	M-93
Zinc	M-11
MORE—	

"L" ORDERS

Aircraft (Light)	L-48
Amusement Machines	L-21
Automobiles	L-2
Automotive Steel	L-21
Auto Replacement parts	L-4
Beds, Springs, Mattresses	L-49
Bright Work	L-69
Bicycles	L-52
Burial Equipment	L-64
Cellophane	L-20
Chlorine	L-11
Closures	L-68
Construction	L-41
Cooking Appliances	L-23
Electric Lamps, Shades	L-33
Electric Power	L-16
Electric Power (Niagara Area)	L-46
Electric Appliances	L-65
Farm Machinery	L-26
Feminine Apparel	L-85
Fire Apparatus (Motorized)	L-43
Firearms	L-60
Fire Protective Equipment	L-39
Flashlights	L-71
Fluorescent Lights	L-78
Foil	L-25
Fuel (Motor)	L-8, 70
Fuel Oil	L-56
Furniture (Metal office)	L-13
Gas Masks	L-57
Generators, Boilers (Used)	L-102
Golf Clubs	L-93
Heating Pads	L-84
Incandescent Lamps	L-28
Industrial Machinery	L-83
Laundry Equipment	L-6
Lawn Mowers	L-67
License Plates	L-32
Liquefied Petroleum Gas Equipment	L-86
Metal Furniture	L-62
Motor Carriers (Pub. Passenger)	L-1, L-35
Motor trucks (heavy)	L-1, L-35
Motor trucks (light)	L-3
Musical Instruments	L-37
Natural Gas	L-31
Office Machinery	L-54-b
Office Supplies	L-73
Outboard Motors	L-80
Plastering Bases	L-59
Plumbing, Heating Products	L-42
Radios, Phonographs	L-44, 44a
Railroad Equipment	L-97, 97-a
Razors, Blades	L-72
Refrigerators:	
Ice (Domestic)	L-7
Mechanical (Domestic)	L-5
Rubber Machinery	L-61
Sanitary Napkins	L-95
Sextants	L-58
Shotguns	L-55
Signs (Metal)	L-29
Suppliers' Inventories	L-63
Telephone Industry	L-50
Toys, Games	L-81
Typewriters, Office Machinery	L-54
Tractors (Track-laying)	L-53
Utensils (Household)	L-30
Vacuum Cleaners	L-18
Vending Machines	L-27
Vitamin A	L-40
Warm Air Furnaces	L-22
Window Framework	L-77

"E" ORDERS

Machine Tools	E-1
Cutting Tools	E-2
Machine Tools (United Kingdom)	E-3
Second Hand Machine Tools	E-4

OPA PRICE SCHEDULES

Acetic acid	No. 31
Acetone	No. 36
Acetyl Salicylic acid	No. 99
Alcohol:	
Ethyl	No. 28
Normal Butyl	No. 37
Wood	No. 34

Subject	Number Order
Aluminum (scrap and secondary)	No. 2
Asphalt Products	No. 45
Automobiles	No. 85
Bags (second-hand textile)	No. 55
Barrels (used steel)	No. 43
Brass mill scrap	No. 12
Burlap	No. 18
Cadmium	No. 71
Carbon tetrachloride	No. 79
Castings (steel)	No. 41
Cigarettes	No. 62
Citric acid	No. 101
Coal (anthracite)	No. 27
Coal (bituminous)	No. 5
Cocoa beans and butter	No. 51
Coffee (green)	No. 50
Coke (by-product)	No. 29
Coke (beehive furnace)	No. 77
Copper	No. 15
Copper scrap	No. 20
Cotton:	
Carded cotton yarns	No. 33
Carded gray and colored	No. 35
Combed cotton yarn	No. 7
Cotton textiles	No. 11
Drums (used steel)	No. 43
Fats and oils	No. 53
Fats and oils and their products	No. 25
Feedingstuffs	No. 74
Fish meal	No. 73
Flashlights	No. 48
Floor covering (resale)	No. 65
Formaldehyde	No. 21
Gears, pinions	No. 105
Glue stock	No. 68
Glycerine	No. 38
Hair (cattle and hog)	No. 24
Hardware (builders)	No. 40
Hide glue	No. 76
Hides	No. 9
Hose (nylon)	No. 95
Iron and steel scrap	No. 4
Iron Ore	No. 113
Kapok	No. 59
Lead (primary)	No. 69
Lead (scrap, secondary)	No. 70
Leather	No. 61
Linens (bed)	No. 89
Lithopone	No. 80
Lumber:	
Aircraft spruce	No. 109
Douglas fir doors	No. 44
Douglas fir lumber	No. 26
Douglas fir peeler logs	No. 54
Douglas fir plywood	No. 13
Southern hardwood	No. 97
Southern pine lumber	No. 19
Western pine	No. 94
Machine tools (second-hand)	No. 1
Machine tools (new)	No. 67
Magnesite	No. 75
Mercury	No. 93
Nickel (scrap and secondary)	No. 8
Oil (Bunker C, No. 6 Fuel)	No. 72
Oil (Pennsylvania crude)	No. 22
Oxalic acid	No. 78
Paper board	No. 32
Paper (waste)	No. 30
Pepper	No. 52
Petroleum and products	No. 88
Pig iron	No. 10
Pipe (soil, cast iron)	No. 100
Radios, Phonographs	No. 83
Radio, Phonograph parts	No. 84
Rags	No. 47
Rails (relaying)	No. 46
Rayon gray goods	No. 28
Rayon waste	No. 90
Refrigerators (household mechanical)	No. 102
Refrigerators (resale)	No. 110
Rubber (reclaimed)	No. 56
Rubber (scrap)	No. 87
Salicylic acid	No. 103
Silk (raw)	No. 14
Soy Bean, Peanut Oil	No. 92
Steel products:	
Mill prices	No. 6
Warehouse prices	No. 49
Stoves (domestic)	No. 64
Sugar (direct consumption)	No. 60
Sugar (raw)	No. 16
Tanks (domestic oil storage)	No. 96
Tea	No. 91
Tin	No. 17
Tires and tubes (new)	No. 63
Tires (retreaded, recapped)	No. 66
Tires and tubes (used)	No. 107
Titanium pigments	No. 98
Upholstery furniture fabrics	No. 39
Vacuum cleaners (resale)	No. 111
Vitamin C	No. 104
Washers, Ironers	No. 86
Wax (paraffin)	No. 42
Wire, Cable	No. 82
Wool floor covering	No. 57
Wool (wool tops, yarns)	No. 58
Zinc (primary)	No. 81
Zinc (scrap and secondary)	No. 3

PRIORITIES ALLOCATIONS

■ Digest of Priority, Allocation, and Limitation Orders. Issued by the War Production Board, New Social Security Building, Washington, D. C., Telephone Republic 7500. On specific problems local Priorities Field Service Offices listed on Page 27 of this section should be consulted.

"M" ORDERS

M-1: Aluminum, effective March 22, 1941. M-1-a effective same date. Both replaced by **M-1-f,** effective Feb. 17, 1942. Provides complete allocation control of virgin and secondary metal. Each producer, approved smelter and fabricator must file, on PD-26a, a shipping schedule for each month by 15th of preceding month. Customers must detail monthly requirements by 5th of preceding month. Aluminum for permitted civilian uses requires rating certificate issued after Oct. 31, 1941. Civilian users must report inventories on PD-40a by April 20, 1942, quarterly thereafter. Only approved smelters and producers may acquire aluminum requiring smelting or melting before being used. Stocks in excess of immediate needs must be sold either to a buyer to fill rated orders for essential items, or as scrap. Order does not apply to products used by ultimate consumer or to finished products moving to ultimate consumer, or to scrap.

M-1-d: Aluminum Scrap, effective Jan. 7, 1942, revoking P-12 and M-1-c. Latter, effective June 10, 1941, revoked M-1-b which became effective April 11, 1941.

Prohibits use of scrap, except home scrap, without authority of Dir. of Indus. Oper. Does not apply to virgin aluminum producers or approved smelters. Beginning March 1, 1942, every plant generating 1000 pounds or more of scrap per month must segregate scrap at the machine. All 17S, 24S and 52S alloy scrap in solid form must be sold to Aluminum Co. of America or Reynolds Metals Co., all other segregated scrap to these companies or approved smelters. Dealers required to dispose of accumulated scrap similarly. Monthly accumulations of 1000 pounds or less may be sold to dealers.

M-1-e: Aluminum, effective Jan. 23, 1942. Prohibits aluminum use except on war contracts and for making following: Anhydrous aluminum chloride for manufacture of dyes for war textiles, high octane gasoline, tear gas, nylon or pharmaceuticals; deoxidizer or alloying agent in steelmaking when consumption not over 0.03 per cent by weight of carbon steel or 0.1 per cent of alloy or deep drawing steel produced; chemical processing equipment where other material impracticable; commercial aircraft with A-10 rating or higher; containers for intravenous solutions and blood; radio condensers for replacement; match plates, patterns and snap flasks used to fill orders with rating higher than A-2; orthopedic equipment requiring light weight; pistons for engines of heavy trucks, heavy duty tractors, diesel engines and engines of portable firefighting equipment; repair and maintenance parts for mechanical or electrical equipment; welding rods; X-ray tube housings; thermit reaction; zinc base alloy, limited to 2 per cent of weight of alloy produced; other alloys, limited to 12 per cent. Aluminum authorized by Priorities Director between Oct. 31, 1941 and Jan. 23, 1942 may be used for purpose specified.

M-1-g: Aluminum Pigment, Paint, effective March 10, 1942. Prohibits manufacture or sale, except retail, unless Director of Industry Operations approves application made on PD-312. Pigment manufacturers and paint formulators and jobbers report stocks to WPB by 15th of April and each succeeding month.

M-2: Magnesium, effective March 24, 1941: M-2-a, supplementary order, effective March 24, 1941; M-2-b, supplementary order, effective Nov. 14, 1941, revokes M-2.

Applies to all materials and products, including scrap, principal ingredient of which is magnesium. Deliveries are subject to monthly allocation by Dir. of Indus. Oper. Magnesium products may be used only on orders carrying a rating of A-1-j or higher. Alloying any material with magnesium without approval of Director of Industry Operations prohibited. All material, in whatever form, not being used to fill orders with ratings of A-1-j or higher, must be disposed of to a producer or approved smelter.

Producers, fabricators, secondary smelters must file PD-26-m monthly by the 20th with Aluminum and Magnesium branch, giving shipping schedules. Users report inventories by the 15th on PD-40-m; stocks, receipts, disposition reported on PD-173 for magnesium and products, on PD-174 for powder metal.

M-3, M-3-a: Tungsten, revoked by M-29.

M-4: Neoprene, effective March 28, 1941. Note: Superseded by M-13.

M-5, M-5-a, M-5-b: Nickel-bearing Steel, revoked by M-21-a.

M-6: Nickel, effective May 15, 1941; Revoked by General Preference Order M-6-a, effective Sept. 30, 1941. Deliveries to be made by producers and distributors only as authorized by Director of Industry Operations, except to Metals Reserve Co. Amendment, March 30, 1942, extends order to cover nickel salts, oxides, carbonates and solutions, concentrates and residues from which nickel commercially recoverable.

M-6-b: Nickel, effective Jan. 20, 1942. Restricts use for certain specified purposes from Jan. 1 to April 1 to 50 per cent of consumption in first quarter of either 1940 or 1941. Curtailment 100 per cent after April 1. Affected uses, except where necessary for operational purposes: Transportation equipment; plating; containers of all types; firefighting and lighting equipment; building supplies; hardware and ornamental metal work; plumbing, heating and air conditioning supplies; clothing accessories, jewelry, toilet articles, accessories, souvenirs, novelties, games, toys, art objects and musical instruments; branding, marking and labeling devices; decorative uses of all kinds; photographic and art equipment and supplies; sporting goods and pleasure boat fittings; saddlery and harness hardware and fittings. Affects domestic and industrial appliances, except heating elements for replacement purposes or in electric ranges, portable heaters and storage type water heaters.

M-8: Cork, effective May 31, 1941. Expired Sept. 30, 1941. M-8-a, effective Oct. 1, 1941. PD-51 is monthly allocation form.

M-9: Copper, effective May 29, 1941; superseded by **M-9-a,** effective Aug. 2, 1941; **M-9-a** amended Jan. 7, Feb. 6, 25, 1942. Refiners may deliver no metal except as authorized by Director of Industry Operations. Persons may obtain copper from dealers without allocation certificates but not from both dealers and refiners. Details regarding toll agreements must be approved by Director of Indus. Oper. Order prohibits sale of copper and its products by mills, warehouses or foundries except on A-10 or higher rating. Fabricators file PD-59 as revised to apply for monthly requirements for domestic consumption and PD-60 as revised to report needs for various classifications. Refiners file PD-61 monthly, listing production and shipments of duty free copper.

PD-76 is copper allocation certificate; PD-121-a is smelters' scrap inventory, PD-121-b foundries' scrap inventory; PD-123 covers December requirements, PD-123-a January requirements, PD-123-b monthly deliveries.

M-9-b: Copper and Copper-Base Alloy Scrap, effective Sept. 30, 1941; amended, effective Dec. 31, 1941, revoking P-61. Specific authorization of Dir. of Indus. Oper. required if brass mill scrap is delivered to anyone except dealer or brass mill; or if other copper or copper base alloy scrap is delivered to anyone except dealer. Use Form PD-130 to apply for such authorization. All military requirements will be filled first and authorization for residual supply to be made at discretion of Dir. of Indus. Oper. Fabricators, except railroads and utilities, may not use or remelt scrap produced in their own operations, or dispose of it except by sale, without permission. No fabricator may keep more than 30-days' scrap accumulation, unless total is less than 5 tons. Producers of more than 2000 pounds monthly must report scrap inventories by 15th of following month on PD-226.

No copper or brass mill scrap may be delivered under future conversion or toll agreements, unless approved by Dir. of Indus. Oper. Dealers are prohibited from melting any scrap without authorization and from accepting scrap unless they have turned over their inventories within the preceding 60 days. PD-130 filed to obtain authorization to receive scrap for processing or melting. Dealers report on PD-249 by 10th of each month to Bureau of Mines, Washington.

Amendment, March 31, 1942, requires obsolete scrap wire or cable used by public utility in own operations be over 5 ft.; monthly use limited to 5 tons.

M-9-c: Use of copper or copper base alloy in manufacture of any one of more than 100 civilian articles prohibited after Jan. 1, 1942. Between Oct. 15 and Dec. 31, 1941, consumption for that purpose limited to one-half the total amount used by a manufacturer of such item during the last three months of 1940 or one-eighth the total amount consumed during 1940.

Amendment, effective Dec. 8, 1941, exempts certain industrial items. Also permits, until March 31, 1942, limited use of inventories of partially fabricated metal in making specified civilian articles, extending original Jan. 1 deadline. Consumers must file PD-189 with WPB by Feb. 9, 1942, PD-175 with each order to supplier. PD-167 filed to obtain relief under hardship clause, PD-172 for permission to use material in stock.

Amendment, Feb. 28, 1942, permits copper use for essential operating, maintenance and repair parts for railroad cars, locomotives, equipment.

Amendment, April 9, 1942, freezes stocks of copper screenings.

M-9-c-1: Copper in Shoes, effective Jan. 23, 1942. Effective March 31, 1942, use of copper in making shoe findings (eyelets, hooks, etc.) prohibited. From Jan. 1 to March 31, manufacture limited to number required, including stocks, to fill orders specifying delivery by April 1. Copper use in that period limited to 50 per cent of consumption in 1940 fourth quarter, or 12½ per cent of total 1940 consumption, or 35 per cent of consumption from July 1 to Sept. 30, 1941, plus requirements to fill war contracts.

M-9-c-2: Copper in Jewelry, effective April 4, 1942. Prohibits copper use in making jewelry after May 15, 1942. Use meanwhile limited to inventory of metal plated or alloyed with gold or silver prior to April 1, 1942, and not plated or alloyed in violation of any other order. Supersedes conflicting provisions of M-9-c, amended.

M-9-c-3: Copper in Printing, March 28, 1942. Permits until June 1, 1942, use of bronze powder, ink, paste and leaf by printing and publishing industry, all from inventory, at no greater than average 1941 rate. Use banned after May 31, 1942.

M-10: Polyvinyl Chloride, effective June 9, 1941. Use Forms PD-7, PD-36. Effective Jan. 1, 1942, all deliveries subject to authorization by Director of Indus. Oper.

M-11: Zinc, effective July 11, 1941; Supplementary orders M-11-a-b-c-d-e-f-g-h fix monthly zinc pool requirements. Producers must set aside from their output each month a quantity specified by Director of Industry Oper. and delivered at his direction. Material produced under toll agreements is exempted from this pool. Consumers must file Form PD-94 by the 10th of each month with Copper, Zinc Branch, WPB, applying for allocation in next month and reporting consumption and inventory. Producers must file PD-50a by 10th of each month listing orders. January pool 31% of October slab zinc output, 10% for zinc oxide February 40% of November for slab, 20% for oxide. March 50% of December for high and special high grade, 40% all other grades for slab; 20% for lead free oxide, 10% for leaded oxide. April pool 60% of January for high grade and special high grade, 40% all others; nothing for oxide or dust.

M-12: Cotton linters, effective June 9, 1941. Use Forms PD-110, 112, 122, 122a.

M-13: Synthetic Rubber (includes Neoprene), effective June 9, 1941. Consumers file Forms PD-7, PD-36 to request monthly requirements. Producers report to Synthetic Rubber Section WPB on PD-33, detailing stocks, production orders. Effective Jan. 1, 1942, all deliveries subject to authorization by Director of Industry Operations.

M-14: Tungsten High-Speed Tool Steel, effective June 11, 1941; amended, effective Dec. 3, 1941. No orders to be placed or filled for tungsten-type steel if molybdenum type will fill buyer's requirements. Total deliveries of tungsten-type steel shall not exceed by weight one-third of deliveries of molybdenum-type steel in the same quarter. Producers must report quarterly to Iron and Steel Branch, WPB, on orders and shipments. Use Form PD-101. Shipments must not cause buyer's inventory to exceed actual needs. Defense orders have preference in allocations of tungsten-type steel by Dir. of Indus. Oper.

M-15: Rubber, effective June 20, 1941. Use Form PD-49. **M-15-a:** Supplementary Order, effective June 27, 1941, expired July 31, 1941. M-15-b, effective Dec. 11, 1941, restricts rubber use to orders with rating of A-3 or higher or for certain specifically listed purposes. M-15-c, effective Dec. 27, 1941, restricts sales of new tires and tubes, subject to Rationing Regulation No. 1. Dealers report tire, tube stocks monthly on PD-216. Amendment to M-15-b, Mar. 1, 1942, restricts rubber use in making certain industrial products to following percentages of average monthly consumption in year ended March 31, 1941: Essential heavy industry belting, hose and packing, 125 per cent; fire and mill hose, 40 per cent; industrial protective devices, 125 per cent; plumbers' supplies, 70 per cent; tanks, pipe, fittings, 140 per cent. Percentages for latex use: Industrial V belts and belting, 85 per cent; electricians' and industrial gloves (without fabric), 50 per cent (20 per cent April 1).

Amendment, March 31, 1942, bans use of reclaimed rubber except for manufacture of products for which crude rubber or latex permitted; certain other items also exempted. Use of reclaimed rubber in filling war orders must be reported to WPB.

Amendment, April 1, 1942, reduces permitted use of crude rubber or latex in more than 50 products, eliminates use entirely in 20 others.

M-17; Pig Iron, Aug. 1, 1941; amended Oct. 14, 1941, April 1, 1942. Customers submit monthly requirements by filing with producers by the 5th of the month on Form PD-69. By the 5th of each month customers must file Form PD-70 with Iron and Steel Branch, WPB, showing stocks, consumption and requirements for following month. Producers must file by the 12th PD-71, PD-71d, covering proposed shipments for coming month. Such shipments may not be made until approved by Dir. of Indus. Oper. All tonnage allocated, including steelmaking iron.

M-18: Chromium, effective July 7, 1941; amended, effective Aug. 22, 1941; revoked by M-18-a, effective Nov. 29, 1941. M-18-a amended Jan. 13, Feb. 4, 1942. Applies to all processors, dealers, producers and purchasers. Includes

ores or concentrates, ferrochromium and combinations with other elements, chromium refractory material and scrap or secondary material. All melting and deliveries must be authorized by Director of Industry Operations. Monthly use of chromium oxide for manufacture of chromium chemicals from ores or concentrates must not exceed monthly average consumption during period July 1, 1940, through June 30, 1941. Monthly requests for chromium, ferrochromium and other combinations used in making steel or for other metallurgical purposes must be made to sellers by the 20th of each month on PD-53a or 53b, with copy to WPB. PD-54 is request for chromium chemicals.

M-18-b: Chromium, effective March 26, 1942. Bans use of chromium in manufacture of roofing materials, ceramics, soap and glass. Chromium pigment use restricted to 90% of amount used in year ended June 30, 1941. Manufacture of chromic acid restricted to 80% of base period rate; chromium use for leather tanning restricted to 90%; all other uses as chemical restricted to 100% of base period.

M-19: Chlorine, effective July 26, 1941. Amendment, issued Dec. 20, provides for direct allocation after Feb. 1, 1942. PD-190 must accompany all orders. Producers file PD-191-a and duplicate copies of each PD-190 with Chemicals Branch, WPB, by 15th each month. Amendment May 1, 1942 prohibits certain uses, curtails others 40% to 90% below use in year ended June 30, 1941. PD-277 must accompany orders for products containing available chlorine.

M-20: Calcium-Silicon, effective, July 29, 1941; revoked by M-20-a, effective, Nov. 29, 1941. All shipments are under direct allocation by Dir. of Indus. Oper. Customers must file Form PD-72 by the 25th with suppliers to obtain shipment the following month, also filing one copy with WPB.

M-21: Steel, effective Aug. 9, 1941; amended effective Sept. 9, 1941. Applies to carbon and alloy iron and steel. Orders are to be filled according to preference ratings. Accumulation of inventories beyond buyers' current needs is prohibited. Customers must file Form PD-73 with each order, summarizing contents of the order by group and product. Material obtained under allocation or preference rating must be used for purpose specified. Dir. of Indus. Oper. may direct producers to make deliveries for particular purposes without regard to preference ratings. Producers must file Forms PD-99 and PD-100 by the 6th of each month with Iron and Steel Branch, WPB, summarizing proposed production, distribution and capacity, also reports covering shipments and backlogs. Extended to Dec. 31, 1942, effective Nov. 25, 1941.

PD-32 is customer's statement of failure to obtain required delivery or place order; PD-34 is producer's affidavit re failure to meet delivery, PD-35 re refusal to accept order, PD-169 monthly plate report.

M-21-a: Alloy Iron, Alloy Steel, Wrought Iron, effective Sept. 16, 1941, revoking M-5, M-5-a, M-5-b, as amended. Amendments effective Nov. 25, Dec. 20, 1941. All provisions of Order M-21 are part of this order. Dir. of Indus. Oper. may specify quantities and forms of alloys in alloy iron or steel. Deliveries under toll agreements must be approved by the Director. Alloy iron or steel is defined as containing manganese in excess of 1.65%, or silicon in excess of 0.60% (5% for iron), or copper in excess of 0.60% or any other element added to obtain a desired alloying effect. Except on orders of A-10 or higher, melting—also delivery after Jan. 1, 1942—of alloy iron or steel containing more than 1.65% Mn; 0.60% Cu., Cr, Mo, Ni; or any Co, W or V added for alloying effect is prohibited.

M-21-b: Steel Warehouses, effective Sept. 3, 1941. Amended, Jan. 1, Feb. 28, 1942. Receipts by a warehouse are limited by a quota established by the Dir. of Indus. Oper. and based on stock shipments during first quarter of 1941. Quotas for merchant products based on receipts from producers in corresponding 1940 quarter or on one-fourth total 1940 receipts. Preference rating of warehouses is A-9. Warehouses must file PD-83 (Revised) by the 15th of each month with Bureau of the Census, detailing stock additions, shipments and inventories. Warehouses are forbidden to sell alloy steel for other than defense purposes, except for essential maintenance and repairs limited to 10 per cent of total deliveries in first quarter of 1941. Plate sales after Jan. 1, 1942 limited to defense orders. Merchant products, termed "Schedule B Products," include concrete bars, pipe, tubes, wire and products, tin and terne plate, galvanized sheets and strip. Distributors of these products exclusively file no monthly reports. Acceptance of steel from any source in excess of assigned quota prohibited. Steel obtained on ratings higher than A-2 must be delivered on orders with similar ratings unless held 90 days.

PD-83-a is delivery statement for first quarter 1941; PD-83-b is preference rating certificate; PD-83-c is producer's statement on consigned sales, stocks; PD-83-d is classification instruction for PD-83; PD-83-e requests change in producers supplying products with A-9 rating; PD-83-f covers producer's shipments of Schedule B products.

M-21-c: Steel Plates, issued Feb. 16, 1942. Includes carbon and alloy steel plates $\frac{3}{16}$-inch or thicker, over 48-inches wide; $\frac{1}{4}$-inch or thicker, over 6-inches wide; 7.65 pounds per square foot or heavier, over 48-inches wide; 10.2 pounds per square foot or heavier, over 6-inches wide. Stainless steel plate sizes are $\frac{3}{16}$-inch or thicker, 10 inches and wider; 7.65 pounds per square foot or heavier, 10 inches and wider. Customers must file PD-298 with producers by 1st of month preceding month in which shipments required. Two copies are filed with producer, one copy with Iron & Steel Branch, Plate & Shape Unit, WPB. Consumers must file PD-299 by 7th of the month, listing consumption, inventories and receipts for preceding month and estimated requirements for two months following. Producers report to WPB daily, weekly and monthly by wire on plate shipments, and monthly on PD-169 and 169-a on schedules for following month. Only plate orders carrying A-10 or higher rating or specifically allocated by Director of Industry Operations may be requested, scheduled or delivered.

M-21-d: High Chromium Steel, Jan. 6, amended March 27, 1942. Bans delivery or use of corrosion or heat-resistant alloy iron or steel containing 4 per cent or more of chromium without A-1-k rating or higher. Does not apply to fully fabricated articles. Persons other than warehouses possessing this material required to file PD-221 with Iron & Steel Branch, WPB, by Feb. 1, 1942.

M-21-e: Tin Plate, Terne Plate, Long Ternes, effective Feb. 3, 1942. Reduces amount of tin per base box of tin plate from 1.35 pounds to 1.25. Limits use of tin plate, terne plate or long ternes in production of any item except as permitted by M-43-a and M-38-c. Long ternes obtainable only on A-10 or higher rating. Terne metal may be used only to produce terne plate or long ternes.

M-21-f: Shot and Bullet Core Steel, effective Feb. 17, 1942. Applies to steel for 20, 37, 40, 57 and 75 mm. and 3-inch armor piercing and semi-armor piercing shot, and .30 and .50 caliber bullet cores. Starting March 1 all deliveries must be made on allocation order. Producers report weekly to WPB and Army and Navy Munitions Board on PD-307. Buyers report monthly on PD-308.

M-22: Silk, effective July 26, 1941. Use Forms PD-77, 78, 78-a.

M-23: Vanadium, effective Aug. 14, 1941. Revoked by M-23-a, Dec. 20, 1941. Includes ores or concentrates, ferrovanadium and combinations with other elements, chemical combinations, and scrap or secondary material containing commercially recoverable vanadium, as well as pure vanadium. Establishes full allocation, requiring deliveries to be authorized by Dir. of Indus. Oper. Buyers must file Form PD-209-a with Vanadium Branch, WPB, and supplier by 20th of month to obtain delivery following month. Monthly deliveries up to 50 pounds contained vanadium do not require this report. PD-209-b is application for allocation.

M-24: Scrap Iron and Steel, effective Oct. 11, 1941. Defense orders must be accepted and given preferential treatment. On or before 15th of each month, producers who during preceding month produced 50 gross tons or more of scrap must report to Bureau of Mines, Pittsburgh, on Form PD-149, listing scrap inventory, production and sales. Dealers and brokers must file Form PD-151 by same date showing scrap inventory, purchases and sales. Consumers must report monthly on Form PD-150 their inventory, production, receipts and consumption. Director of Indus. Oper. has broad powers to control deliveries of scrap at his discretion.

M-24-a, March 24, 1942, prohibits sale or shipment of tinned scrap in any of 27 specified California counties, except to broker or dealer, or to detinning or copper precipitation plant there. Detinned scrap must go to copper precipitation plants.

M-25: Formaldehyde, Paraformaldehyde, Hexamethylenetetramine and Synthetic Resins, effective Aug. 23, 1941. (Amendment), effective Aug. 28, 1941.

M-26: Silk Waste, effective Aug. 8, 1941.

M-27: Phenols, effective Aug. 30, 1941. Amended Nov. 10, 1941, to provide complete allocation. Use Forms PD-1, 178a, b; 180.

M-28: Chlorinated Hydrocarbon Refrigerants, effective Aug. 22, 1941. Use PD-160, 162.

M-29: Tungsten, effective Aug. 31, 1941, revoking M-3, M-3-a. Includes secondary material containing commercially recoverable tungsten. Buyers of 100 pounds or more of contained tungsten monthly file request for material with WPB by 10th of month on PD-9, filing one copy with supplier. Authority of Director of Industry Operations required to deliver ferrotungsten, metal powder and chemicals going into metal powder. Chemical tungsten processors, other than of forms going into tung-

sten powder, are generally limited in processing or purchasing to 90% of rate for 12 months ended June 20, 1941. M-29-b, effective Feb. 14, 1942, prohibits use of tungsten in grinding wheels, gauges, and as coloring material for rubber, linoleum, paper or similar materials after May 1, 1942. Use until that date limited to 17½% of amount used in year ended June 30, 1941. Other users must limit consumption after April 1 to 17½% of use in base year. Exemptions: Government contracts; orders with A-1-j rating or higher; safety requirements; alloy steels; welding rods; laboratory, electrical, radio, X-ray equipment; electronic relays and electric lighting uses.

M-30: Ethyl Alcohol and Related Compounds, effective Aug. 28, 1941.

M-31: Methyl Alcohol, effective Aug. 28, 1941. Amendment, Dec. 31, 1941, forbids use for manufacture into, or packaging as, anti-freeze agent.

M-34: Toluene, effective Aug. 28, 1941. Placed under complete allocation, effective Feb. 1, 1942. To request deliveries, buyers file PD-223 with orders by 10th of month. Producers file PD-224 and copy of each PD-223 with Chemicals Branch, WPB.

M-36: Manila Fiber and Manila Cordage, effective Aug. 29, 1941. Amendment, Oct. 14, 1941. Use Forms PD-128, 129. Amendment, effective Dec. 19, 1941, makes deliveries of fiber subject to authorization by Dir. of Indus. Oper. Limits deliveries of cordage to orders with rating certificate of A-1-j or better, or for ships, oil or gas well drilling. Use Form PD-128.

M-37, a, b: Rayon Yarn, effective Sept. 13, 1941. Use forms PD-112, 113. PD-102, a is allocation request, PD-106 is actual allocation. M-37-c superseded 37-a, April 1, 1942.

M-38: Lead, effective Oct. 4, 1941. Refiners and dealers must file Form PD-124 with Dir. of Indus. Oper. by the 20th of each month, detailing proposed shipments for the following month. Each refiner must set aside in April a pool tonnage equal to 15% of February production, as fixed by Dir. of Indus. Oper., to be allocated directly for emergency needs. Refiners must ship balance according to preference ratings. Lead released by Metals Reserve Co. is allocated by Dir. of Indus. Oper. Consumers must file Form PD-66 by the 15th of each month with WPB Lead Commodity Branch, applying for allocation in the following month and detailing inventories. PD-66-a covers monthly allocations.

M-38-c: Lead, effective Jan. 10, 1942. Restricts lead use for certain purposes between Jan. 1 and March 31 to 50 per cent of amount used in either third or fourth quarter 1941. After April 1 consumption banned completely. Prohibited uses are: Automobile body solder; ballast or keels for pleasure boats; blocks for cutting leather; building supplies; caskets and casket hardware; foil; ornamental glass; regalia; badges and emblems; statuary and art goods; tennis court markers; toys, weights for bats, clocks, decoys, dresses, golf clubs, jockey saddles. Exempted are uses called for by safety regulations, government contracts, orders of A-1-j or higher and in plants where corrosion makes lead imperative. Use PD-234 to seek exemptions. Amendment, April 6, 1942, prohibits use in buttons, costume jewelry, novelties, trophies. Lead foil for cigarette packaging banned May 1, 1942. Permits manufacture of lead rods used in stained glass windows and, when other material impractical, making of foil for condensers, electrotyping and moulding lead, and dental X-ray equipment and supplies.

M-39: Cobalt, effective Nov. 3, 1941, amended Feb. 7, 1942. Includes cobalt in all forms. All deliveries must be authorized by Director of Industry Operations. Buyers of more than 50 lbs. of contained cobalt in one month must file with supplier and WPB Forms PD-152 and PD-153 by 20th of month to receive delivery following month. **M-39-b,** effective Feb. 7, 1942, prohibits cobalt use in all pigments after May 1, restricts use until then to 40% of amount used first six months of 1941. Consumption for other purposes from Feb. 1 to April 1 limited to 23% of amount used first six months of 1941; quarterly consumption after April 1 cut to 35% of use first six months of 1941. Specified exceptions include government orders, orders with A-1-j or higher rating, ground coat frit for enameled steel.

M-40: Sperm Oil, effective Oct. 16, 1941.

M-41: Chlorinated solvents, placed under full priority, Oct. 15, 1941. Use form PD-127.

M-43: Tin, effective Dec. 18, 1941. All shipments and uses must be authorized by Director of Indus. Oper. Distributor may deliver less than 5-ton lots to regular customers, subject to Priorities Regulation No. 1. Imports must be sold to Metals Reserve Co.

Use PD-213 to apply for allocation. Amendment, effective Jan. 14, 1942, cuts permissible amount sold without authorization by Dir. Indus. Oper. from 5 tons to 3, limits total monthly receipts from all suppliers to 5 tons. Amendment April 10, 1942, prohibits sales, except by retailers, of solder containing more than 16% tin, any tin-bearing babbitt metal or tin oxide. Exceptions: Orders rated A-9 or higher; orders rated A-10 or higher if for equipment maintenance or repair; for making tin cans under Order M-81.

M-43-a: Tin, effective Dec. 31, 1941, amended Feb. 14, March 17, 1942. Consumption in making certain items between Jan. 1 and March 31 limited to 50% of use in 1940 period; banned completely April 1, 1942. Items include advertising specialties, art objects, auto body solder, musical instruments, beverage dispensers, britannia metal, broom wire, buckles, buttons, chimes and bells, emblems and insignia, eyelets, fasteners, foil (except for condensers, electrotyping and moulding lead in printing trades, X-ray supplies and dental use), galvanizing, household furnishings and equipment, jewelry, kitchen equipment, novelties, souvenirs, trophies, ornaments, pewter, decorative plating and powder, refrigerator trays and shelves, seals and labels (except meat seals), slot and vending machines, pin-ball games, coated paper, oxide in enamelware as pacifier, toys. Use PD-229 to appeal for exemptions. For items not specified tin use cut 50% from base period rate until April 1, 60% thereafter. Substitutes or secondary tin must be used whenever possible.

Tin content of lead base alloy other than solder limited to 12%; solder to 38% until May 1, 30% thereafter; collapsible tubes to 7½%; terne for terne plate to 15%; long ternes to 10%. Virgin tin banned for making or treating type metal. Manufacturing jewelers prohibited Feb. 14 from processing in any way the tin in their possession; revised March 17 to permit use before May 1 of 3% of amount used in year 1941. National Lead Co. designated to purchase excess stocks of jewelers' tin-bearing metal stocks at prices fixed by WPB.

Amendment, April 4, 1942, permits use of enough solder to manufacture cans permitted by Order M-81. Auto body solder defined to include tin-bearing material used as filler or smoother on autos or trucks. Amendment, April 10, 1942, permits tin use for combat end products.

M-44: Titanium Pigments, effective Dec. 1, 1941, amended Jan. 7, 1942. Applies to distribution of titanium dioxide for use as pigment. Sets up defense pool of 20% of daily production to fill mandatory purchase orders. Remaining production is to be prorated on an equitable basis to all customers. Use Forms PD-145, 146. Amendment, Feb. 1, 1942, increases pool percentage to 25%.

M-45: Sheet steel inventory for Steel Drums, effective Nov. 17, 1941, amended Dec. 31, 1941. Directs reservation by Dir. of Indus. Oper. of designated quantity of hot rolled sheets in drum makers' possession or ownership, for subsequent use in making drums for overseas shipment of petroleum and other products. Also applies to sheets obtained under P-76. Use PD-154-a to order reservation; PD-155a is authorization to process steel.

M-46: Chlorinated Rubber, effective Nov. 1, 1941. Fabricators file PD-143 to list needs, PD-144 to report receipts, use and inventory. Amendment, Feb. 23, 1942, restricts uses generally to military needs. Stocks for other uses must be reported to WPB.

M-47: Burlap, effective Dec. 21, 1941, placed under complete allocation. Importers and bag manufacturers use PD-186 to establish quotas. PD-188 filed monthly, starting Feb. 15, 1942. Under amendment effective Dec. 31, importers must set aside two-thirds of receipts for disposition by WPB.

M-49: Iridium, effective Dec. 12, 1941. Forbids use of iridium and alloys in jewelry manufacture. PD-211 used to report monthly sales or transfer of metal.

M-50: Jewel Bearings, issued Jan. 14, 1942. Provides for complete allocation, starting March 1, 1942. Until then all sales not specifically authorized by Dir. Indus. Oper. are prohibited, except for delivery on orders of A-1-j or higher. Use PD-235, 236. Amendment Feb. 28, 1942, prohibits use of large bearings except on A-9 or better orders, unless units in place Jan. 15, 1942.

M-51: Pigs' and Hogs' Bristles, effective Dec. 13, 1941. M-51-a, effective Jan. 7, 1942, requires all persons having title to bristles to report on PD-217 to Bureau of Census by Jan. 15, 1942.

M-52: Sulphite Pulp, effective Jan. 9, 1942. Directs distribution and conserves supply.

M-53: Printing Ink, effective March 30, 1942. Limits use of following to 70% of 1941 rate in making printing inks: Chrome yellows and oranges, molybdate orange, chrome green, orange mineral and organic pigments. Use of iron blue limited to 100% of 1941 rate.

M-54: Molasses, effective Dec. 31, 1941. Restricts monthly deliveries to various types of purchasers up to 50 per cent of monthly average receipts in 12 months ended June 30, 1941. Deliveries

for foundry purposes limited to 110 per cent of base period rate.

M-55: Sugar, effective Dec. 22, 1941. Use Form PD-206.

M-57: Tung Oil, effective Jan. 8, 1942. Sales limited to A-2 orders or better, with following exceptions: For food can linings and outside can coatings when necessary; for Defense Supplies Corp.; and to comply with safety and health regulations. Amendment, March 13, 1942, permits holders of tung oil they are not permitted to use to sell to consumers for approved uses.

M-58: Glycerine, March 30, 1942. Deliveries of more than 50 pounds monthly placed under allocation, effective May 1, except for war orders and health supplies. Use for making anti-freeze banned, other uses limited to 70% of average 1940 rate. Users file PD-362 monthly with suppliers and WPB. Refiners and producers report on PD-363. Users of over 50 pounds in any of past six months report before May 1 on PD-361.

M-59: Palm Oil, effective March 20, 1942. Restricts use to manufacture of tin plate, terne plate, long ternes and steel sheets and strip; to manufacturing processes in which glycerine produced, provided remaining glycerine in product not over 1⅛%. Holders of more than 30,000 pounds of palm oil report to WPB by April 15, 1942 on PD-355.

M-60: High Lauric Acid Oils, effective March 20, 1942. Prohibits use of oils which do not produce glycerine or in which amount of glycerine remaining exceeds 1⅛% on anhydrous soap basis.

M-61: Madagascar Flake Graphite, effective Feb. 17, 1942. Limits use to manufacture of crucibles, subject to authorization by Director of Industry Operations. Producers request authorization monthly on PD-303A and PD-303B. Buyers seeking any article containing this material apply on PD-1A.

M-62: Sodium Nitrate, effective Jan. 15, 1942. Full allocation starts Feb. 1, 1942. Producers and distributors who have not received specific directions by first of month covering deliveries may make deliveries without limitation, subject to provisions of Priorities Regulation No. 1. Use PD-238 to report receipts.

M-63: Imports of Strategic Materials, effective Dec. 28, 1941. Covers antimony, cadmium, chromium, copper, graphite, hyanite, lead, mercury, rutile, tungsten, vanadium, zinc, zirconium. Imports to be handled only by Metals Reserve Co. or other governmental agency, unless permission granted by Dir. of Indus. Oper. upon submission of Form PD-222a. Amendment, effective Jan. 13, 1942, adds hides, skins, asbestos originating in Rhodesia or Union of South Africa, copra and palm, tung and rapeseed oil. Amendment, March 14, 1942, removes restrictions on imports of cadmium; zinc, lead and copper ores and concentrates. Amendment, April 9, 1942, adds columbite and columbium ore, tantalum ore, mercury-bearing ores and concentrates, graphite, cotton linters of chemical grades and various nuts and nut oils.

M-65: Cadmium, effective Jan. 17, 1942. Deliveries prohibited except to distributors who during preceding 60 days disposed of cadmium equal to amount on hand at time of delivery; or on orders of A-10 or higher; or unless authorized by Dir. of Indus. Oper. Order **M-65-a,** effective Jan. 17, 1942, curtails cadmium use in various specified items during January to amount consumed in January, 1941; prohibits use entirely starting Feb. 1, 1942. Consumption for other purposes in first quarter limited to 70 per cent of like 1941 period; banned completely starting April 1, 1942. Prohibited uses include certain items under: Automotive, trailer and tractor equipment; building supplies and hardware; home furnishings and equipment; textile equipment and miscellaneous.

M-66: Cashew Nut Shell Oil, effective Jan. 13, 1942. Use limited to defense orders rated A-2 or better for brake linings or resins required for insulating aviation ignitions or for impregnating electrical coils.

M-67: Plumbing, Heating, Electrical Supplies, effective Jan. 3, 1942. Revoked by L-63.

M-68: Material for Oil Industry, effective Dec. 23, 1941. Restricts use of materials in discovery, development and depletion of petroleum pools, including extraction plants. Use OPC Forms PD-214a, b or c. Amendment, effective Jan. 14, 1942, permits completion of wells being drilled on Dec. 23, 1941, forbids drilling unless property interests within 40-acre area have been consolidated. M-68-c, effective Jan. 14, 1942, forbids construction of new facilities or improvements to present ones, including filling stations, unless approved by Dir. Indus. Oper. Exempts work already under way and to be completed within 60 days.

M-69: Distilled Spirits, issued Jan. 10, 1942. Requires all distilleries equipped to make 190 proof ethyl alcohol to make that type, starting Jan. 15, 1942. Deliveries subject to direction of Director of Industry Operations.

M-70: Jute, issued Feb. 27, 1942.

M-71: Fats and Oils, effective Dec. 29, 1941. Regulates supply and distribution.

M-72: Tin and Lead Scrap, effective Jan. 8, 1942. Dealers are forbidden to accept deliveries of scrap unless during the preceding 60 days they have disposed of an amount equal to their inventory on date of delivery. Direct allocation by Director of Indus. Oper., provided, when necessary. Dealers and consumers must report by 10th of each month to Tin-Lead Branch, WPB, detailing inventory, production, purchases, sales and consumption for preceding month.

M-73: Wool, effective Jan. 3, 1942. Processing from Jan. 3, to April 4, 1942, limited to 80 per cent of basic quarterly poundage.

M-73-a: Men's and Boys' Clothing, March 2, 1942. Specifies styles for wool suits, overcoats.

M-75: Diphenylamine, effective Jan. 30, 1942. Deliveries only upon instruction of Director of Industry Operations in schedules issued beginning of each month. Application for making deliveries filed on PD-263, application for accepting delivery on PD-262, 266.

M-76: Turbines, effective March 9, 1942. Enables Director of Industry Operations to establish schedules for manufacture of land turbines.

M-77: Rapeseed Oil, March 23, 1942. Use after March 31 limited to making marine engine, heavy machine engine lubricating and pneumatic tool oils; factice for compounding rubber; blown rapeseed oil used in manufacture of above grades.

M-78: Mercury, effective Jan. 23, 1942. For following purposes use of mercury in period Jan. 15 to March 31, 1942 limited to 50 per cent of consumption in corresponding 1940 period or first quarter of 1941: Carroting of hat fur; marine anti-fouling paint; thermometers (except industrial and scientific); treating of green lumber (except Sitka spruce); turf fungicides; vermilion; wall switches for nonindustrial use; wood preservation. Use for these purposes prohibited entirely starting April 1, 1942. For following purposes quarterly mercury use limited to amount consumed in base period: Fluorescent lamps; health supplies; mercuric fulminate for ammunition; industrial and scientific thermometers. Use of mercuric fulminate for commercial blasting caps limited to 125 per cent of base period.

M-79: Asbestos, effective Jan. 20, 1942. Starting Feb. 1, 1942 processing of various grades of imported fibre prohibited, except to fill certain specified defense orders. Permission of Dir. of Indus. Oper. required to install high-temperature pipe covering, except for installations of 200 degrees Fahr. or over. Ship installations exempted from latter. Processors file PD-251 or PD-252 by 10th each month. PD-253 filed upon request.

M-80: Sole Leather, effective March 12, 1942. Set aside 80% of top grade leather soles for military shoes.

M-81: Tin Plate, Terne Plate, effective Feb. 11, 1942. Specifies products that may be packed in cans, sizes of cans to be used, amount of tin and tin plate allowed for can manufacturing. Small sizes generally eliminated. No limitation placed on can production for packing fruits and vegetables of primary importance. Those of secondary importance and important medical, chemical, dental and industrial products limited to 100% of 1940 use. Products not specifically listed, including beer, tobacco, dog food, petroleum products, may use 50% of tin plate and terne plate required in corresponding 1940 period until March 1, none thereafter. Use of tin plate with tin coating of 1.5 pounds per base box permitted for cans to pack certain acid-type foods. No restrictions on orders with rating higher than A-2. Until April 30, 1942, delivery and use of special products and non-essential cans completely manufactured before Feb. 11, or cans whose component parts were cut or lithographed by Feb. 11, are permitted. Delivery and use through 1942 permitted of cans of any size for primary and secondary products which completely made or parts cut or in canner's possession Feb. 11. Use PD-269 to seek exemption from order. Amendment, April 6, 1942, limits packing of condensed soup in tin plate after June 30 to certain specified kinds.

M-82: Hemp Seed, effective Jan. 23, 1942.

M-83: Teak, effective March 5, 1942. Restricts use to Army and Navy.

M-84: Agave Fiber, effective Feb. 20, 1942.

M-85: Kapok, effective Feb. 4, 1942. Restricts consumption to military and a few essential civilian uses.

M-89: Corundum, effective Feb. 7, 1942. All deliveries allocated by Director of Industry Operations. Sellers required to file PD-293 with WPB by Feb. 20, 1942 and by 10th of succeeding months.

M-91: Cotton Duck, effective Feb. 28, 1942. Limits deliveries to fill orders rated better than A-2.

M-92: SXP Cotton Seed, Feb. 20, 1942.

M-93: Wood Pulp, effective March 12, 1942. Provides for complete allocation.

M-94: Shearlings, effective Feb. 16, 1942.

M-95: Rhodium, effective March 11, 1942. Prohibits use in jewelry plating, except for current stocks. Sellers report to WPB on PD-295, consumers on PD-296.

M-96: Agar, effective Feb. 9, 1942.

M-97: Coal and Coke, effective Feb. 13, 1942. Inventory restrictions of priorities Regulation No. 1 revoked as they affect coal and coke, permitting inventory accumulation by consumers.

M-98: Raw Cane Sugar, effective Feb. 15, 1942.

M-100: Rationing of Trucks, Truck-Tractors, Trailers, effective March 9, 1942. Program to be administered jointly by WPB and Office of Defense Transportation. Application form and instructions available at truck sales agencies. Applicants approved by WPB and ODT receive Certificate of Transfer, issued by Director of Industry Operations, permitting purchase. Preference given military forces, police, public health and sanitation services, communication services and transportation directly connected with war effort. PD-310 is application form.

M-101: Mica, effective March 6, 1942. Prohibits processing of block mica of quality better than heavy-stained, except for government and Lend-Lease orders. Processors report to WPB on PD-325.

M-102: Goose, Duck Feathers, Feb. 24, 1942.

M-103: Dyestuffs, March 28, 1942. Earmarks various dyes for war use and restricts civilian use of others.

M-104: Tin and Terne Plate Closures, effective April 3, 1942. Use of tin or terne plate banned May 1, 1942, in making crown caps for beer and carbonated beverage containers, screw bands for two-piece home-canning closures, and closures for containers of specified foods and other products. Effective immediately, use banned in making any cover caps and closures (including those made of black plate) used on glass containers of animal food.

M-106: Shellac, effective April 14, 1942. Restricts use by makers of phonograph records and radio transcriptions to about 30% of 1941 consumption, by others to 75% of corresponding 1941 period rate until June 30 and 35% by quarters thereafter. Freezes 50% of all inventories of 10,000 lbs. or more and 50% of future imports, for sale to Defense Supplies Corp. Persons holding 5000 lbs. on April 1 must report to WPB by May 9 on PD-334.

M-108: Can Enamel, effective March 23, 1942. Prohibits enamel on can ends, except to protect printing which designates contents, or to coat ends made of electro-plated sheet or untinned material. Sale of enamel for prohibited use banned.

M-109: Rough Diamonds, March 27, 1942. Requires owners of 10 carats or more on March 31, 1942, to report them to WPB on PD-376 by April 30, 1942. Sales and imports of more than 5 carats must be reported within 10 days on PD-377; smaller sales reported monthly on PD-378. Does not cover cut or polished gems nor rough diamonds in a tool in use. Diamonds in unused tools must be reported.

M-110: Molybdenum, issued March 18, 1942, effective May 1. Covers all forms, including scrap. Provides for complete allocation. Buyers file PD-358 and 359 with WPB by 20th of month for delivery following month. PD-360 filed with WPB and supplier to request delivery. Buyers of less than 50 pounds per month do not file.

M-111: Tea, March 27, 1942. Regulates deliveries to distributors.

M-112: Antimony, March 30, 1942. Full allocation starts May 1, 1942. April deliveries limited to January or February rate but none on ratings below A-10. Effective July 1, all use banned for paints, lacquers, enamels or for toys and ornaments; new antimony use for auto battery alloys limited to 7% of total and total antimony content of such alloys limited to 7½% by weight. No alloy may contain more than 0.5% antimony, or 0.5% above amount required by specification. Consumers file orders with suppliers by 20th each month on PD-381 and report to WPB on PD-380. Holders of more than 100 pounds of antimony must file PD-380 by April 20.

M-113: Canners' and Canmakers' Boxes, effective March 23, 1942. Revokes inventory restrictions as they affect seasonal demand for packing boxes.

M-114: Goatskins, Kidskins, Cabrettas, effective March 30, 1942.

M-115: Collapsible Tin Tubes, effective April 1, 1942. Bans production of tubes containing more than 7½% tin, except for certain pharmaceutical preparations. Permits use of tubes containing 7½% tin for tooth pastes and shaving creams, but retail buyers must turn in used tube for each new one bought.

M-116: Closure Enamel, effective April 4, 1942. Prohibits enamel use on exterior of tin or terne plate closures for glass containers, except to protect necessary lithographed printing, or if closures sterilized for use with human food, or if closures made of electroplated tinned sheet. When used, enamel weight should be no more than nine-tenths of 1940 standard practice.

M-119: Rubber Sealed Closures, effective April 9, 1942. Beginning April 19, 1942, manufacture and sale of rubber sealed closures for glass containers used in packing certain foods prohibited. Use of such closures for packing specified products banned May 9, 1942.

M-123: Asbestos Textiles, effective March 30, 1942. Limits deliveries to makers of industrial packings, such as gaskets, pump packings, etc., and to fill orders rated A-10 or higher.

M-125: Loofa Sponges, effective April 8, 1942. Sale, delivery or use limited to orders rated A-1-a or better.

M-129: Waste Paper, effective April 6, 1942. Permits makers of paper and paper products to accumulate waste paper inventories without restriction.

M-131: Quinine, effective April 4, 1942.

M-133: Rotenone, effective April 13, 1942.

"P" ORDERS

P-1: Cranes and Hoists, effective March 12, 1941; revoked by P-5, effective May 26, 1941; revoked by P-5-a, effective Aug. 1, 1941; superseded by P-5-b, effective Nov. 1, 1941. Assigns A-1-a, b, c ratings on deliveries of materials required to fill defense orders. Rating may be applied only to: Motors and other electrical accessories; alloy and carbon steel bars, forgings, castings, plates, sheets, shapes and tubes; ferrous and nonferrous castings; machine parts and accessories; cutting tools; abrasives; measuring instruments and gages; brass, copper and steel tubing and fittings; oil resisting hose; hydraulic bridge brakes; gasoline and diesel engines and accessories; paints, lacquers and finishing materials; maintenance and shop supplies; foundry supplies, including scrap, pig iron, coke, and alloys. Use Forms PD-81, 81-a, 88.

P-2: Metalworking Equipment, effective March 28, 1941; revoked by P-11, effective July 1, 1941; revoked by P-11-a, Sept. 30, 1941.

P-3: Material Entering into the Production of Airframes, effective April 29, 1941, rating A-1-d. Replaced by P-109, Feb. 20, 1942.

P-4: Material Entering into the Production of Airplane Engines and Propellers, effective April 29, 1941, rating A-1-c. Replaced by P-109, Feb. 20, 1942.

P-4-b: Cranes and Hoists. See P-1.

P-6: Defense Supplies Rating Plan, effective May 31, 1941. Replaced by Production Requirements Plan (P-90), applicable starting first quarter 1942.

P-6-a: Civil Aircraft, Repair Parts and Accessories, effective July 21, 1941, rating A-10. Rating applies to parts for repair of all registered and certificated civilian and publicly owned airplanes.

P-7: Materials and Equipment Entering into the Production of **Merchant Ship Construction,** effective June 12, 1941, ratings A-1-a (1941), A-1-b (1942), A-1-c (1943).

P-8: Material Entering into **Freight Car Construction,** effective June 18, 1941, rating A-3.

P-9-a-b-c-d-e-f-g: Heavy Bombers, effective June 26, 30, 1941. Replaced by P-109, Feb. 20, 1942.

P-10: Material and Equipment Entering into the **Conversion of Ships,** effective June 19, 1941, rating AA. Use Forms PD-41, PD-41-a.

P-11-a: Metalworking Equipment, effective Sept. 30, 1941, revoking P-11, P-2. Ratings as assigned by Priorities Division are applicable to deliveries of same materials included in P-5-b (See P-1: Cranes, Hoists), except brakes and engines. Rating may be extended by supplier. PD-81 used to report monthly assignments of rating, PD-88 to apply for rating.

P-12: Aluminum Scrap, effective June 26, 1941. Repealed by M-1-d, Jan. 7, 1942.

P-13: Material Entering into the Production of **Airframes,** effective July 3, 1941. Replaced by P-109, Feb. 20, 1942.

P-14-a-b: Material and Equipment Entering into the Construction of **Ship Ways,** effective July 12, 1941, rating A-1-a (1941), A-1-b (1942-43).

P-15: Material for **Electrical Relays** and Solenoid Assemblies, effective July 11, 1941. Replaced by P-109, Feb. 20, 1942.

P-16: Material for **Radio Receiving,** Transmitting and Directional Equipment, effective July 11, 1941, rating A-1-c.

P-17: Canning Machinery, expired Aug. 31, 1941.

P-18: Cutting Tool Equipment, effective July 31, 1941; revoked by P-18-a, effective Aug. 28, 1941. Assigns A-1-a rating to deliveries of materials required in producing following tools for defense orders: Drills, reamers, countersinks, counterbores, spotfacers, taps, chasers for self-opening die heads, chasers for collapsing taps, milling cutters, form tools, gear cutting and finishing tools, hobs, boring bars and tools, metal cutting shear knives, metal cutting circular saws and machine broaches. Rating also may be used by suppliers of the producer. Materials affected include high-speed, carbon tool and alloy steel bars, sheets, rods, shapes, forgings and castings; cutting tools, abrasives; measuring instruments, maintenance and shop supplies. Use PD-6 (revised) for tabulation of rating extensions. After July 1, 1942, priority assistance must be obtained under Production Requirements Plan.

P-19: Material Entering into the Construction of **Defense Projects** outside U. S., effective July 18, 1941, rating as assigned. Use PD-200 to apply for rating. PD-200-a is project materials list.

P-19-a: Material Entering into the Construction of **Defense Projects** (limited to Priorities Critical List), effective July 18, 1941, rating as assigned. (Although this order not superseded, P-19 is effective order covering these specified projects.)

P-19-b: Material Entering into the Construction of **Certain Defense Projects** with Protected Delivery Dates effective July 30, 1941, rating as assigned. Use PD-68 to report rating assignments. PD-68a is certification to accompany builders' or suppliers' orders.

P-19-c: Material entering into construction of publicly financed defense housing, effective as issued, rating as assigned.

P-19-d: Material entering into construction of housing projects for defense workers, effective Sept. 9, 1941, rating as assigned.

P-19-e: Material entering into construction of road projects, effective Oct. 18, 1941, rating as assigned. Use Form PD-81. Amendment, effective March 6, 1942, eliminates extension of ratings to purchase road building machinery and equipment. May be used for repair parts needed to prevent work stoppage.

P-19-g: Defense Projects, Housing. Use PD-81. Does not include copper sheet or pipe.

P-20: Material Entering into the Construction of Specified Locomotives, effective July 21, 1941, rating A-3. Use PD-64-a.

P-21: Material Entering into the Repair and Rebuilding of Steam, Electric or Diesel Locomotives, effective July 21, 1941, rating A-3. Use Forms PD-65, PD-65-a.

P-22: Repairs, effective Sept. 9, 1941; superseded by P-22-Amended: **Repairs, Maintenance and Supplies,** effective Oct. 16, 1941. Revoked by P-100.

P-23: Materials for the Production of **Mining Machinery** and Equipment, effective July 29, 1941. Replaced by P-56-a, Dec. 31, 1941.

P-24: Experimental, Research Work, effective Aug. 5, 1941. Assigns A-1-b rating to deliveries of material entering directly or indirectly into experimental work.

P-25, P-26 series: Tanks. Light tanks covered by P-25-a-b-c-d, effective Aug. 11, 1941, P-25-e, effective Oct. 9, 1941. Medium tanks covered by P-26-a-b-c-d, effective Aug. 11, 1941, P-26-e, effective Oct. 9, 1941. Preference rating A-1-f assigned materials for light tanks, A-1-d for medium tanks. In both cases orders "a" refer to accessories and equipment, "b" to spare parts and accessories, "c" to 30-caliber and 37-mm. guns for light tanks and 37-mm. and 75-mm. guns for medium tanks, "d" to gasoline and diesel engines and "e" to material entering into production of the tanks. Amendment, Dec. 12 1941, changes all ratings to A-1-a. Rating must be obtained under P-90 after May 31, 1942.

P-29: Health Supplies Rating Plan, effective Aug. 25, 1941, rating A-10. Use Forms PD-79, PD-81. Amendment, February 14, 1942, substitutes endorsement on purchase orders for furnishing copies of P-29 to extend rating.

P-31: Foundry Equipment, effective Sept. 5, 1941. Extended to May 30, 1942. Assigns A-1-b rating to deliveries of certain material entering into manufacture of following types of equipment when required to fill defense orders: Molding and core machines; blast cleaning equipment, dust arrestors, sand preparing and handling equipment and briquetting equipment. Materials involved include castings; forgings; sheets, bars, shapes, plates and tubing of ferrous, nonferrous and nonmetallic materials; electrical equipment and accessories; mechanical equipment and accessories; cutting tools; maintenance and shop supplies.

P-32: Farm Equipment Parts, effective Aug. 20, 1941. Revoked Dec. 27, 1941. See P-95, L-26.

P-33: Farm Machinery and Equipment, effective Aug. 20, 1941. Revoked Dec. 27, 1941. See P-95, L-26.

P-35: Half-Track Vehicles, effective Dec. 5. Assigns A-1-f rating to delivery of materials required. Rating may be extended. Rating obtained under P-90 after May 31, 1942.

P-38: Material Entering into the Production of **Radiosondes,** effective Aug. 26, 1941, rating A-1-d. Use Forms PD-6, 6-a.

P-39: Welding Machines, effective Sept. 12, 1941. Assigns A-1-c rating to deliveries of certain material entering into manufacture of arc welding and resistance welding equipment (excluding electrodes), provided the equipment is required to fill defense orders. Materials affected are: Ferrous and nonferrous forgings, castings, sheets, bars, rods, plates and wire; insulation materials, motors, and other electrical accessories; gasoline and diesel engines and accessories; machine parts and accessories; brass, copper and steel tubing and fittings; maintenance and shop supplies. After May 1, 1942, ratings must be obtained through P-90.

P-40: Industrial Lift Trucks, effective Sept. 12, 1941. Assigns A-1-g rating to deliveries of certain materials entering into production of power-driven trucks required to fill defense orders. Materials affected include: Iron or steel castings, and steel forgings; motors and other electrical accessories; ferrous, nonferrous and nonmetallic bars, sheets, plates, shapes and sections; finished or semifinished parts and accessories, including wheels and tires; gasoline engines and accessories. Amendment, effective Dec. 30, 1941, permits rating to be used for production of spare parts. After May 10, 1942, ratings must be obtained through P-90.

P-41: Material Entering into the Construction, Maintenance and Operation of **Defense Projects,** effective Aug. 27, 1941, rating A-1-a. Applies only to Pan American Airways Inc. Form PD-6.

P-42-a: Material entering into maintenance and repair of **Canning Machinery** and Equipment, effective Sept. 12, 1941. Issued to American Can Co. Use Forms PD-6, 6a.

P-43: Laboratory Supplies, Equipment, effective Aug. 28, 1941. Assigns A-2 rating to deliveries of materials to be used for scientific research conducted by the laboratory, or which will enter into production of such materials. PD-93 used to report orders to which rating assigned, PD-88 for application for rating. PD-107 is questionnaire to rating applicants.

P-45: Fire Apparatus, effective Oct. 31, 1941. Assigns A-2 rating to deliveries of material Amended Feb. 28, 1942. Assigns A-2 rating to deliveries of material required to fill defense orders, limited in quantity and kind by Director of Industry Operation on PD-82. P-45-a, effective Nov. 22, 1941, gives A-8 rating to purchases of fire fighting equipment by U. S. Forest Service.

P-46: Utilities, effective Sept. 17, 1941; amended Nov. 25, 1941, March 26, 1942. Grants A-2 rating to materials required for maintenance, repair and operating supplies for power plants and pumping plants; A-5 rating granted for all other facilities, for materials to extend service to projects having A-5 or better rating and for materials needed to protect plants against sabotage. Supplier's rating is A-5. Power line extensions to new consumers limited to 250 feet. Scheduled material deliveries and stock withdrawals, except in emergencies, limited to 1940 rate. Rating use for capital additions limited to $1500 for underground connections, $500 for other additions.

P-47: Material Entering into the Maintenance and Repair of **Air Transportation Facilities,** effective Sept. 6, 1941, rating A-3. Use PD-96. Raised to A-1-j March 6, 1942.

P-51: Material Entering into the Production of **Canning Machinery** and Equipment, effective Sept. 22, 1941, rating A-3. Applies to Food Machinery Corp.

P-52: Aircraft Accessories, effective Sept. 15, 1941. Replaced by P-109, Feb. 20, 1942.

P-53: Textile Machinery Parts, effective Sept. 13, 1941. Assigns A-10 rating to deliveries of material for production of parts for maintenance and repair of textile machinery and equipment. Supplier of material also may extend rating assigned him by producer. PD-88 to apply for rating. Effective Feb. 28, 1942, rating is A-8.

P-54: Trucks, Trailers, Busses, effective Sept. 12, 1941. Assigns A-3 rating to deliveries of materials to builders of trucks weighing 4½ tons or more, trailers 5 tons or more and busses seating 15 or more persons. Also may

be extended to deliveries to any supplier of such materials. After April 30, 1942, ratings must be obtained through P-90.

P-55: Defense Housing Projects, effective when issued. Applies rating as determined by Dir. of Indus. Oper. to certain authorized materials required in connection with privately financed defense housing projects. Application for rating to be filed on Form PD-105. Amendment, March 3, 1942, provides that suppliers who process material extensively should apply for assistance under P-90 on PD-25A. Rating extended by builder or subcontractor must be countersigned by FHA agent.

P-56: Mines, effective Sept. 22, 1941; amended, Dec. 2, March 2, 1942. Assigns A-1-a rating to material deliveries for repairs in event of breakdown; A-1-c to material up to minimum required to avert breakdown; A-1-c to material for other repairs to selected list of machinery and equipment. (Less essential mining enterprises may use A-1-c rating only in case of imminent breakdown); A-8 for other repairs, maintenance, operating supplies essential to operations; A-10 for all other repair, maintenance, operating supplies. Does not cover gold or silver mines. Approval of Director of Industry Operations necessary to apply A-1-a, A-1-c ratings for machinery and equipment. Inventories of operating supplies in relation to production must not exceed average ratio of 1938, 1939, 1940. Operators report on PD-119 to designated state agency by 10th of each month on purchases.

P-56-a: Mining Machinery and Equipment, issued Dec. 31, 1941, replacing P-23. Amended March 2, 1942. Provides for ratings—dependent on ratings of orders producer is filling—to delivery of materials for production of mining machinery and equipment, and parts thereof, of specified types. Rating may be extended by supplier. Application for assistance made on Form PD-25A, covering requirements for three months. Amendment, April 13, 1942, permits use of ratings in making deliveries to companies operating under P-58, P-68, P-73 and, with permission, P-65-a.

P-57: Automobile Repair Parts, effective Sept. 18, 1941. Assigns A-10 rating to deliveries either to a producer or to his supplier of material required for production of replacement parts for passenger cars, and trucks of less than 1½-ton capacity.

P-58: Supplies for South American mines, effective Oct. 8, 1941; amendment issued Feb. 14, 1942, effective as of Jan. 1, 1942. Includes Cerro de Pasco Copper Corp., Andes Copper Mining Co., Chile Exploration Co., Braden Copper Co. Assigns A-1-d rating to orders for delivery before Oct. 2, 1942 in quantities double those shipped April 1—Sept. 30, 1941; A-3 to deliveries June 30—Oct. 1, 1942. Total acquired under both ratings limited to three times shipments during base period.

P-61: Copper Scrap, effective Oct. 13, 1941. Revoked by amended M-9-b, Jan. 6, 1942.

P-62: Material for production of **Laboratory Equipment,** Reagent Chemicals, rating A-5, effective Nov. 15, 1941.

P-65: Marine Paints, effective Dec. 5, A-3 rating assigned for raw materials upon filing PD-82 with WPB.

P-68: Steel Plant Maintenance, Oct. 31, 1941, amended April 11, 1942. Assigns A-1-a rating to materials for repair of iron or steel plant facilities in event of actual breakdown when parts are not otherwise available; A-1-c to material to make reasonable advance provision to avert breakdown (A-1-a, A-1-c ratings available only after advance approval by Dir. of Indus. Oper.); A-1-c to deliveries for ordinary maintenance, repair or operating supplies to 30% of material ordered in one quarter, A-3 to 70%. Deliveries not permitted if inventories exceed 125 per cent of dollar volume on last day of preceding calendar half-year. Quarterly withdrawals from inventory must not exceed 55% of volume in preceding six months. Amendment, Feb. 27, 1942, extends orders to Canadian and detinning plants; provides A-10 rating for supplies not directly related to actual production. PD-148 used to apply for rating. PD-228 filed monthly to report A-1-c applications.

P-71: Material entering into completion of certain **Private Housing Projects** not qualifying under P-55, issued Dec. 23, 1941, rating A-10. Builders obtain rating on PD-135.

P-72: Elevator Escalator Repair Parts, effective Nov. 10, 1941, amended Jan. 22, 1942. Assigns A-3 rating to deliveries of materials used to make repair parts for elevators, escalators and dumbwaiters. Limited to quantities and kinds of material authorized on Form PD-25A. Separate application required if parts to be used in South and Central America and Caribbean area.

P-73: Smelters, Refiners of Copper, Lead, Zinc, Antimony, Mercury, Cobalt, issued Dec. 22, 1941. Assigns A-1-a rating to material for repair of actual breakdown; A-1-c for material to avert breakdown; A-3 to other material for repair maintenance or operation, also for deliveries to suppliers. Producers must file PD-212 with WPB before applying rating. PD-248 lists purchases of materials.

P-74: Heat Treating Furnaces, effective Nov. 22, 1941. Assigns A-1-c rating to deliveries of certain materials to manufacturers of furnaces used in heat treatment of metals, when such furnaces are used to fill defense orders. Materials affected include rolled steel bars, plates, sheets, shapes and tubes; ferrous and nonferrous forgings and castings; abrasives; indicating instruments; refractories and insulation; controlled atmosphere generators; burners and accessories; finishing materials; maintenance and shop supplies; foundry supplies, including scrap, pig iron, coke and alloys. Rating may be used to make spare parts.

P-75: Materials for production of **Tackle Blocks,** rating A-1-c, effective Oct. 24, 1941. Filed PD-82 to obtain rating.

P-76: Steel sheets, 16 and 18 gage, for manufacture of **Drums,** rating A-4, effective Nov. 17, 1941. Use PD-156a to apply for rating. Amended Dec. 31, 1941 to permit acquisition of sheets of any gage.

P-77: Rebuilt Machine Tools, effective Nov. 10, 1941. Assigns A-1-c rating to deliveries to rebuilder of machine tools of the following materials required for this purpose: Motors and other electrical accessories; iron, steel, brass and bronze castings; alloy and carbon steel bars, forgings, castings, shapes and tubes; cutting tools and abrasives; measuring instruments; brass, copper and steel tubing and fittings; oil resisting hose; bearing metals anti-friction bearings; machine parts and accessories. Tools rebuilt from material so obtained must be guaranteed for 30 days and must be used to fill defense orders. PD-157 is report of sales, PD-179 is application for material.

P-78: Conveyor Machinery, effective Nov. 10, 1941. Expired Jan. 31, 1942. Priority assistance obtained under P-90 by filing PD-25 A.

P-79: Non-Metal Containers, effective Nov. 14, 1941, amended March 11, 1942. Assigns A-7 rating to deliveries of steel wire and A-5 on other ferrous materials to producers of cooperage and wooden and paper board containers. Ratings may be applied only to quantities and kinds of material authorized by Director of Industry Operations on PD-82.

P-82: Blind-made Products, effective Nov. 29, 1941. Assigns A-8 rating to materials authorized by Dir. of Indus. Oper. quarterly, based on information furnished on Form PD-166. Applications of rating by producer and suppliers filed by 15th each month, PD-81.

P-83: Supplies for Petroleum Industry, issued Dec. 8, 1941. Assigns A-8 rating to materials for supply houses serving petroleum industry. PD-82-a used to obtain rating.

P-84: Plumbing, Heating Repairs, effective March 13, 1942. Assigns A-10 rating to materials for emergency repairs. Does not apply to copper parts or scarce materials for which substitutes available.

P-85: Resistance Welding Electrodes, effective Dec. 3, 1941. Assigns A-1-c rating to deliveries of materials used in making spot welding tips, resistance welding dies, seam welding wheels, water-cooled holders for tips. Use PD-82 to obtain rating.

P-86: Industrial Explosives, effective Dec. 12, 1941, rating A-8. Use Form PD-82.

P-87: Insecticides, germicides, fungicides, effective Dec. 13, 1941, rating A-10.

P-88: Railroad Material, effective March 17, 1942. Assigns A-1-a rating for materials needed for emergency repairs upon specific approval of WPB; A-3 for materials essential for track, structure, signal and train and locomotive repair and operation, including perishable tools; A-8 on all other maintenance repair and operating supplies. Use of A-3 and A-8 ratings and ratings for raw materials and quantities thereof determined by WPB on quarterly basis. Inventories reported on PD-352.

P-89: Chemical Plants, effective Jan. 23, 1942. Assigns A-1-a rating to producer of material for repairs in event of actual breakdown of plant; A-1-c for repair material up to minimum required to avert breakdown; A-3 for other material for repair, maintenance or operation; A-3 for material delivered to supplier or sub-supplier. Rating may be used only after serial number assigned by Chemicals Branch, WPB, to producer upon application. Ratio of materials inventory to current operations must not exceed average of 1938, 1939 and 1940. Amendment, March 2, 1942, redefines operating supplies, excludes materials incorporated into producer's products. Permits Canadian firms to use ratings.

P-90: Production Requirements Plan. issued Dec. 3, 1941, effective first quarter of 1942. Replaces Defense Supplies Rating Plan (P-6). Ratings covering materials needed for defense or essential civilian production during that quarter assigned by Director of Indus. Oper. after applicant files Form PD-25A. One or more ratings may be as-

signed to cover all or any specified part of applicant's requirements. Where deliveries must be scheduled beyond March 31, 1942, an additional Form PD-25A may be submitted. Capital items may not be obtained by rating assigned by this order. Forms submitted after Jan. 1, 1942 restrict priority assistance to remainder of first quarter. No ratings other than those authorized in PD-25A may be used by those operating under the plan.

Amendment, Jan. 30, 1942, permits extension of AA ratings without special permission from Production Requirements Branch. PD-25F is application used to expedite delivery and to seek rating on additional material or higher ratings. Modified Production Requirements Plan, for manufacturers with annual sales under $100,000, uses Form PD-25-X, similar to above. Amendment, March 10, 1942, permits use of ratings assigned by other certificates to obtain material not regularly carried in stock.

P-91: Elevators, Escalators, Dumbwaiters, issued Dec. 30, 1941. Assigns A-2 rating to deliveries of material required for building this equipment on defense orders only. Permission to use rating must be authorized by Div. of Indus. Oper. on Form PD-25a, covering kinds and quantities of materials to be used in succeeding quarter.

P-92: Steel Plate and Welding Electrodes, issued Jan. 17, 1942. Assigns priority to deliveries of these materials to training classes for welders under United States Office of Education. Rating determined after application received on PD-183. No more than 30 per cent of plate deliveries may be new material.

P-95: Farm Machinery and Parts, effective Dec. 27, 1941. Assigns A-3 rating to deliveries of material for production of new machinery and parts as limited by order L-26.

Note: P-32, P-33 revoked. Use PD-81. Amendment, March 30, 1942, adds irrigation equipment to items in building of which A-3 rating available for delivery for material.

P-98: Petroleum Industry Materials, effective Jan. 14, 1942. Assigns following ratings to delivery of materials: A-1-c for geological search for unknown pools, A-2 for search by exploratory wells; A-2 for research laboratories seeking higher production methods; A-8 for maintenancee, repair or operating supplies; A-1-a for repairs of actual breakdown, except transportation equipment which takes A-2; A-1-c to avert breakdown of producing or refining equipment; A-2 for certain chemicals and other materials used in refining; A-8 for making alterations. Permission of OPC in Washington necessary to use A-2 or higher rating, except for research or laboratory purposes. OPC field representative must sign orders with A-8 or lower rating for supplies valued at over $500. **P-98-a,** Jan. 21, 1942, permits use of P-98 ratings by operators outside United States. Amendment, March 15, 1942, adds office supplies and certain automotive equipment to items to which P-98 ratings may be extended.

P-100: Repairs, Maintenance, Supplies, effective Dec. 18, 1941, revoking P-22, rating A-10. Limits stocks of materials for these purposes to 110 per cent of purchases in corresponding 1940 quarter. Withdrawals from inventory similarly limited. Does not apply if purchases or withdrawals are $5000 or less per quarter. May not be used for material required for plant expansion or improvements. Plants working overtime get extra allowances. Operating supplies include ferrous parts used to make containers. Application for rating not required. Does not apply to mines. Amendment, Feb. 10, 1942, makes those using tools or equipment to repair or maintain farm machinery, and Canadian firms buying war or essential civilian materials in United States eligible for priority assistance. Amendment, Feb. 28, 1942, extends A-10 rating to boiler inspectors, etc. Amendment, March 9, 1942, assigns A-10 rating for repair and maintenance of refrigerating equipment in stores and restaurants.

P-101: Bookbinding Wire, effective Jan. 24, 1942. Assigns A-8 rating to materials for manufacture of flat steel wire used for binding processes in printing and publishing industries, excluding pre-formed staple, box stay and specialty binding wire. Used only for materials authorized by Dir. of Indus. Oper. upon submission of Form PD-82. WPB determines requirements on quarterly basis.

P-103: Gasoline Refinery (British), Dec. 29, 1941. Assigns A-1-c rating to Anglo-American Purchasing Co., New York, for operating materials.

P-106: Copper and Brass Mill Maintenance, issued Feb. 7, 1942. Provides A-1-a rating to material for repair in event of actual breakdown; A-1-c for material to make reasonable provisions to avert immediately threatened breakdown; A-3 to deliveries of other material for repair, maintenance, operation, and to deliveries to sub-suppliers under above ratings. Use of A-3 rating to obtain "other material" limited to quantities obtained in 1941. Authorization by WPB necessary to use A-1-a or A-1-c ratings. Ratio of current operations to inventory of repair, maintenance and operation material must not exceed average for 1938, 1939 and 1940.

P-107: Repair Parts for Medium and Heavy Trucks, Truck Trailers, Passenger Carriers, effective Jan. 22, amended March 6, 1942. Assigns A-2 rating to deliveries of material entering into manufacture of specific list of parts. Manufacturers must file PD-25A by June 1 for rating to be effective on deliveries after June 30, 1942.

P-108: Fire Protective Equipment, effective Feb. 26, 1942. Assigns A-7 rating to deliveries of steel pipe, cast iron pipe and fittings for use in making such equipment, A-3 for other materials, to be specifically authorized by Director of Industry Operations.

P-109: Aircraft Products, effective Feb. 20, 1942, replacing P-3, P-4, P-9-a through P-9-g, P-13, P-15, P-52. Assigns A-1-a rating to material entering into military aircraft products. May be applied only if material not otherwise available and if material physically incorporated into aircraft products or is necessary in production. Covers aircraft, engines and propellers, delivery schedues of which are approved by Joint Aircraft Committee, components and spare parts. Amendment, March 11, 1942, abolishes distinction between material incorporated into products and other material used to build aircraft. Applies to tactical types of craft. P-109-a, effective March 11, 1942, assigns A-1-b rating to material for trainer types of planes, other provisions similar to P-109.

P-110: Remodeling Projects, issued April 10, 1942. Provides A-5 rating to deliveries to builders and subcontractors of materials on Defense Housing Critical List costing not over an average of $100 per room for remodeling of dwellings in Defense Housing Critical Area. Cost of scarce materials per structure limited to $800. Builders file PD-406 with local FHA office to apply for rating. Rated projects are exempt from Order L-41.

P-115: Canning Plant Maintenance and Expansion, effective Feb. 11, 1942. Assigns A-1-a rating to plants canning fruits or vegetables, for emergency repairs to avert spoilage of food in event of actual breakdown. WPB must be advised when rating used. A-3 rating granted for other material for replacement, addition or expansion. Excludes all new buildings, and new production lines used for canning other than peas, tomatoes.

P-116: Osnaburg, effective Feb. 14, 1942, rating A-1-j to Defense Supplies Corp.

P-120: Aluminum, Magnesium Plants, issued March 20, 1942. Covers producers and basic fabricators on plant repairs, maintenance and operating supplies, applicable when specifically assigned by WPB. PD-371 used to apply for rating, PD-372 to report quarterly use of ratings. A-1-a rating assigned to material required in event of actual plant breakdown, A-1-c for materials required to avert breakdown, A-1-j to other materials. Suppliers may extend A-1-a or A-1-c rating only if unable to fill order from inventory; rating to replace supplier's inventory is A-1-j.

P-122: Aircraft, effective March 9, 1942. Raises to A-1-a or A-1-b all ratings previously assigned by preference rating certificates PD-1, PD-1A, PD-3, PD-3A or PD-5 for military and naval aircraft. A-1-a applies to tactical planes, A-1-b to trainers.

"E" ORDERS

E-1: Machine Tools, effective March 28, 1941. Supplementary Order No. 1, effective July 7, 1941, revoking E-1, revoked Jan. 15, 1942 by E-1-a. Contains names of contractors (urgency standing) to receive preference in tool delivery. Guides tool makers in delivery schedules when preference ratings alike. List not made public. Amendment, March 26, 1942, excludes drill chucks from types of chucks controlled by order. Prevents orders received after March 25, 1942, for any tool from being given priority in production schedules unless rating assigned by PD-1A or PD-3A or Order P-19-h endorsed on order.

E-2: Cutting Tools, effective July 17, 1941. (Amendment), effective July 25, 1941; superseded by E-2-a, effective Aug. 28, 1941; limits deliveries to orders with A-10 or higher rating. Buyers must certify deliveries will not increase stocks above 90-day supply.

E-3: Machine Tools, allocation for United Kingdom, effective Jan. 12, 1941.

E-4: Second Hand Machine Tools, effective Feb. 3, 1942. Authorizes Director of Industry Operations to prohibit sale or other disposal of any second hand machine tool and to determine allocations.

"L" ORDERS

L-1: Motor Trucks and Public Passenger Carriers, effective Aug. 30, 1941. Sales of 1942 trucks banned Jan. 1-March 8 (See M-100). March production quota for medium trucks (weighing less than 16,000 pounds) cancelled March 2. Unused portion of February quota must be completed by April 30. Production

of trucks of any size after March 2 limited to partially and fully fabricated materials on hand Feb. 28. Sales ban lifted on tank vehicles used to transport petroleum products. All production of medium trucks for civilian use prohibited after April 30, heavy trucks after May 31, 1942.

L-2: Passenger Automobiles, effective Sept. 13, 1941. Production for any purpose banned, starting Feb. 1, except operations extended to Feb. 10 to fill January quota.

L-2-i, March 9, 1942, prohibits automotive companies from selling alloy steel except on orders of A-1-K or higher rating, all other steel on A-3 or higher rating. Sales must be certified to Distressed Stocks Unit, Iron & Steel Branch, WPB.

L-3: Light Motor Trucks, effective Sept. 13, 1941. Production for any purpose banned, starting Feb. 1, except operations may continue until Feb. 10 to fill January quota.

L-4: Repair Parts for Passenger Cars and Light Trucks, effective Sept. 18, 1941. Limits production from Sept. 15-Dec. 31, 1941, to 60 per cent of number of replacement parts sold for such purposes from Jan. 1 to June 30, 1941, or from July to Dec. 31, 1940. January quota one-third of sales first quarter 1941; superseded by quota for first half of 1942, set Jan. 22, at 150 per cent of number of parts sold for replacement in all of 1941.

L-5: Domestic Mechanical Refrigerators, effective Sept. 30, 1941. Class A manufacturers who sold 16,000 or more units monthly in year ended June 30, 1941, required to cut output from Aug. 1 to Dec. 31, 1941, to 50,400 units or to five times 55 per cent of monthly average sales in base period. Class B makers, who sold 5000 to 16,000 units monthly in the base period, required to cut output to 17,750 units or five times 63 per cent of monthly average sales in base period. Class C makers, who sold 5000 units or less monthly in the base period, required to cut output to at least five times 71 per cent of monthly average sales in base period. Monthly quotas for January and February, 1942, set at 48 per cent of monthly average sales in base period for Class A group, 3500 units or 60 per cent of base for Class B, 70 per cent of base for Class C. L-5-b, Feb. 14, 1942, freezes all new refrigerator stocks, except dealers may sell 100 units or 1/12 number sold in 1941 before retail stocks frozen. Spare parts manufacture not restricted. Amendment March 26, 1942 lifts dealer sales restrictions, except on gas and kerosene refrigerators. L-5-c, effective Feb. 23, 1942, prohibits production of complete units after April 30, 1942. Production between Feb. 14 and April 30 limited to three times maximum quota permitted by above regulations for either January or February. Ratio of deluxe models to all others must be no higher than in Aug. 1, 1941-Jan. 31, 1942 period. Amendment March 28, 1942, permits production of kerosine refrigerators.

L-6: Domestic Laundry Equipment, (washers and ironers), effective Oct. 29, 1941. Monthly average sales in year ended June 30 taken as base. Original curtailment was for five months ended Dec. 31; amended Dec. 12 to five months ended Jan. 31, 1942. Makers with monthly average sales of over 12,000 units in base period required to cut output 20 per cent in five months ended Jan. 31, 1942, 40 per cent for February. Makers with monthly average sales of 5000-12,000 units required to cut output 16 per cent for five months, 25 per cent for February. Makers with sales of less than 1200 not required to cut output for five months, 5 per cent for February. Quotas for March 1-15, 1942: Class A manufacturers, 3900 units or 30% of factory sales in year ended June 30, 1941; Class B, 1875 units or 32½% of base period sales; Class C, 570 units or 37½% of base period sales; Class D, 47½% of base. L-6-c, March 14, 1942, prohibits any production after April 14 by companies making more than 60,000 units in base period, after May 14 by others. Meanwhile output limited to 1⅓ times February quotas.

L-7: Domestic Ice Refrigerators, effective Oct. 28, 1941. During four months ended Dec. 31, 1941, no manufacturer permitted to use more than four times 65 per cent of monthly average of steel consumed during 12 months ended June 30, 1941. Steel consumption in future quarters is limited to 60 per cent of quarterly average use during base period or during three years ended June 30, 1941. After June 30, steel use per box limited to 20 lbs.

L-8: To restrict distribution of motor fuel in Atlantic coast area, effective Sept. 30, 1941. Revoked Oct. 24, 1941.

L-11: To restrict use of chlorine in manufacture of Pulp and Paper Board, effective Nov. 15, 1941.

L-13: Metal Office Furniture, Equipment, effective Nov. 7, 1941. Manufacturers classified as: Class A, using 12,000 or more tons of steel the 12 months ended June 30, 1941; Class B, using 3000-12,000 tons; Class C, using less than 3000 tons. Products divided into: Group 1, essential products in which wood not a possible substitute; Group 2, both essential and nonessential products for which wooden substitutes not available; Group 3, products in which wood can be substitutes. Effective April 1, manufacture of Group 1 products banned, except for Army, Navy, Maritime Commission orders or those rated higher than A-2; steel use in making metal shelving (Group 2) limited to 50% of base period rate; steel use in April and May by Class A manufacturers in making Group 3 products and any other office furniture not mentioned in Groups 1 or 2, limited to 40% of base period rate. Making of Group 3 products banned after May 31. Manufacturers prohibited from disposing of steel stocks except on orders rated A-2 or better or on orders for RFC agencies.

L-16: To restrict Electric Power consumption in Southeast, effective Oct. 30, 1941. Modified Dec. 5, 1941. Revoked Jan. 5, 1942.

L-18: Domestic Vacuum Cleaners, effective Nov. 27, 1941. Manufacturers whose monthly average sales in year ended June 30, 1941, were 5200 units or more, directed to cut production in three months ended Dec. 31, 1941, to 15,600 units or to three times 90 per cent of monthly average sales in year ended June 30, 1941. Manufacturers whose monthly average sales in year ended June 30, 1941, were less than 5200 units, required to cut production in three months ended Dec. 31, 1941, to three times 100 per cent of monthly average sales in year ended June 30, 1941. In first quarter 1942, large manufacturers limited to 11,700 units or three times 60 per cent of monthly average sales in base period. Small manufacturers limited to three times 75 per cent of monthly average in base period. Production banned after April 30, 1942. April production limited to 3900 units or 60% of monthly average factory sales in year ended June 30, 1941, for larger manufacture; to 75% of average sales in base period for smaller producers.

L-20: Cellophane and similar Transparent Materials derived from Cellulose, effective Nov. 8, 1941. Use of these products for packaging or manufacturing following products prohibited: Razor blades, cosmetics and soaps, textiles, rubber and rubber products except for substitute for Holland cloth in backing or retreading stocks for tires, hardware, metals, sporting goods, paper and paper products, laundry, candles and wax products, electrical equipment except manufacture thereof, decorations and novelties.

Amendment, effective Jan. 10, 1942, extends ban to fountain pens, pencils, leads; jewelry, clocks, watches, cameras; wood and its products; leather and its products; brushes, combs (except tooth brushes); bottled beverages; bottled foods; canned goods; flowers; cleaning material; cigar and candy boxes (not used to protect contents); bowl and garment covers; household dyes; sewing supplies; toys and games; coat hangers; cake decorations; sponges; powder puffs; hair nets and hair waving equipment; doilies; brake linings; moldings; paints; molding clay and clay products; cigarettes (unless foil is omitted); plastic products. Stocks Jan. 8 exempt.

L-21: Automatic Phonographs, Weighing, Amusement and Gaming Machines, effective Dec. 10, 1941. December production of automatic phonographs, weighing and amusement machines cut 25 per cent below monthly average production in year ended June 30, 1941. Curtailment increased to 50 per cent in January, 75 per cent thereafter. Production of gaming machines cut 50 per cent below base in December, 75 per cent in January, 100 per cent thereafter. Manufacturers file PD-182 monthly. L-21-a, March 16, 1942 prohibits production after April 30, 1942. Output March 1-April 30 limited to three times February quota. Fabrication of copper, copper alloy, stainless steel prohibited. Making spare parts for slot machines banned.

L-22: Warm Air Furnaces, effective April 11, 1942. Iron and steel use in 1942 by manufacturers or assemblers of 8000 or more furnaces in 1940 limited to 50% of 1940 consumption other producers limited to 90%.

L-23: Stoves, Ranges, other domestic cooking appliances, effective Dec. 13, 1941. Class A manufacturers with sales of $3,000,000 or more in year ended June 30, 1941, directed to cut iron and steel consumption in first four months of 1942, 42 per cent below monthly average use in base period. Class B companies with sales of $1,000,001 to $3,000,000 in base period to cut consumption 36 per cent. Class C companies with sales of $1,000,000 or less to cut 30 per cent. Use of iron or steel for cover tops prohibited after Dec. 15, 1941; manufacture of bright metal parts prohibited after Feb. 1, 1942.

L-25: To limit use of Tin Foil and Lead Foil, effective Nov. 24, 1941. Revoked Jan. 15, 1942. Restrictions covered by M-23-a, 38-c.

L-26: Farm Machinery, effective Dec. 31, 1941. Restricts use of strategic materials for new farm machinery to 83 per cent of 1940 consumption and materials for repairs parts to about 150 per cent of the 1940 level. Establishes quotas of types of machinery permitted to be made. L-26-a, March 9, 1942,

limits March output of farm tractors requiring rubber tires to 55% of January-February 1942 monthly average; April output 40%. Banned completely May 1, 1942. Amendment to L-26, March 30, 1942, revises production quotas, increasing estimated material requirements, mostly iron and steel, by about 25,000 tons for period Nov. 1, 1941 to Oct. 31, 1942.

L-27: Vending Machines, effective Dec. 31, 1941. Steel and alnico magnet consumption in January, 1942, cut 25 per cent from average monthly use in year ended June 30, 1941, 50 per cent thereafter. Use of other metals cut 50 per cent in January, 75 per cent thereafter. L-27-a, March 17, 1942, prohibits production after April 30, 1942. Spare part manufacture limited to rate in year ended June 30, 1941.

L-28: Incandescent Lamps, effective Jan. 24, 1942. Starting Feb. 1, 1942, use of materials obtained on preference ratings prohibited in making lamps for decorative or advertising purposes, and quarterly consumption of nickel, brass, copper or other such metal cut 50 per cent below average quarterly use in 1940. In making all types of lamps, consumption of nickel cut 25 per cent, brass and copper 20 per cent, from 1940 average.

L-29: Metal Signs, March 25, 1942. Metal use in making signs of more than 36 sq. in. limited during second quarter 1942 to 12½% of use in 12 months ended June 30, 1941. All metal use banned July 1. Signs containing less than 5% of metals by weight not affected. Iron and steel stocks may be sold only on orders rated A-3 or better, except to government agencies.

L-30: Household Utensils, March 31, 1942. During second quarter 1942, steel use to make cooking utensils cut 10% from amount of scarce materials (iron, steel, tin, aluminum, nickel, copper and alloys, chromium and lead) used in 12 months ended June 30, 1941. In making kitchen ware and essential household articles steel use cut 30%, zinc use cut 50% from base period. In making non-essential household and other miscellaneous articles, use of iron, steel, zinc cut 50%; 100% after June 30.

L-31: Natural Gas, effective Feb. 16, 1942. No gas allowed for structures unless heating equipment installed or specified in construction contract and main foundation completed by March 1. Conversion from some other fuel to gas must be completed by Feb. 26, 1942. Applies to all or parts of Alabama, Arkansas, California, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Maryland, Michigan, Mississippi, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia. Other provisions require utilities to insure adequate supply of natural and mixed natural and manufactured gas for war production.

L-32: Metallic License Plates, effective March 18, 1942. Prohibits state and local governments from issuing plates in one year in quantity more than 10% of weight of plates issued in corresponding year ending between June 30, 1941 and July 1, 1942, and then only to replace destroyed or lost plates, for new licensees or for "date tabs" not more than 4 square inches in size.

L-33: Portable Electric Lamps, Shades, effective March 23, 1942. Until April 30, 1942, production and metal consumption limited to 70% of average 1940 rate; limit is 60% thereafter. Nonferrous metal use permitted only for sockets, switches, plugs and lamp cords, except parts in stock March 23 may be used for ensuing 30 days.

L-35: Spare Parts for medium and heavy trucks, truck trailer, passenger carriers, effective Jan. 22, 1942. Limits production in 1942 first quarter to 60 per cent of number sold for replacement purposes in second half of 1941. Amendment March 6 raises quota for first half of 1942 to 75 per cent of 1941 period; three quarters to 112½ per cent; 12 months to 150 per cent.

L-37: Musical Instruments, effective Feb. 17, 1942. During March, April, May, manufacturers limited to 18¾% of critical materials used in 1940 to make instruments and accessories containing less than 10% of critical materials and all spare parts; plus 16¼% of 1940 total for instruments and accessories with 10% to 25% critical materials content; plus 12½% for instruments and accessories with 25% or more content.

L-39: Fire Protective Equipment, effective Feb. 24, 1942. Includes fire extinguishers, sprinkler systems, fire hydrants and fittings, hose racks and dryers, lightning rods. Specifies products for which strategic materials may be used. Limits quarterly production of foam and anti-freeze extinguishers to quarterly average for year ended Nov. 30, 1941, except to fill government or lend-lease orders. Assembly of parts already fabricated Feb. 24 is permitted to fill defense orders with A-2 or higher rating.

L-40: Vitamin A, effective Feb. 10, 1942.

L-41: Construction, effective April 9, 1942. Bans new construction, remodeling or rehabilitation, not including maintenance or repair, with following exceptions: For specified government agencies identified with the war effort; for activities used directly in discovery, development or depletion of mineral deposits; construction subject to Order M-68; residential construction costing less than $500 or restoration from fire, damage by nature or the enemy after Dec. 31, 1941; agricultural construction costing less than $1000; construction authorized by OPM or WPB; other construction, including public works, costing less than $5000. Existing restrictions on various material uses remain in effect. When priorities assistance not required, application for authority to begin construction made on PD-200 and PD-200A.

L-42: Plumbing and Heating Products, effective Feb. 11, 1942. Simplifies various items manufactured by plumbing and heating industry. Schedule I establishes pressure ratings for iron, brass and bronze valves. After Feb. 28 all valves produced or sold (except those in stock) must conform to standards established.

Schedule II, effective March 1, 1942, establishes sizes and standards for gray cast and malleable iron, brass and bronze pipe fittings permitted to be produced or sold. Exempts finished fittings on hand March 1, also certain types used in shipbuilding. Schedule III, issued March 7, 1942, eliminates metal jackets, fusible plugs and tricocks from low pressure heating boilers after June 1, 1942, unless units were in stock on that date. Stops production of metal jackets March 16, 1942. Schedule IV, effective April 1, 1942, directs discontinuance of manufacture of medium soil pipe; reduction in weight of extra heavy soil pipe, elimination of use of brass pipe plugs and brass-trap screws with soil pipe fittings. Amended June 1, 1942, to confine production to type between standard and medium.

Schedule V, effective April 1, 1942, lists specific plumbing fixtures which may be made of copper, copper-base alloy or die-cast zinc.

Schedule VI, April 16, 1942, establishes types and sizes for tubular radiators, eliminating production of larger units. Schedule VII, effective April 1, 1942, restricts copper and copper alloy use in hot water heaters and piping systems.

Schedule V-a, effective June 15, 1942, prohibits use of copper or its alloys in making: Bath tub fillers and nozzles; shower fittings; lavatory compression faucets; lavatory combination faucets; sink compression faucets; combination sink and laundry tub faucets and spouts; laundry tray faucets; outlet plugs and strainers; tail pieces; flush ells; flush valves for closet tanks. Use permitted for certain component parts, such as valves, except for last four items.

L-43: Motorized Fire Apparatus, effective Feb. 27, 1942. Eliminates use of fire bells, aluminum, copper, nickel, chromium, cadmium, tin, zinc, steel, synthetic rubbers, except for limited use in specific list of products. Manufacture of motorized apparatus prohibited except to fill defense orders. Sizes of fire engine pumps standardized.

L-44: Radio Receivers, Phonographs, effective Jan. 23, 1942. Monthly production in 90 days after Jan. 23 cut 45 per cent below monthly average in nine months ended Sept. 30, 1941 for manufacturers who sold more than $1,000,000 of sets for civilian use in first nine months of 1941, smaller firms cut 35 per cent. L-44-a, March 7, 1942, prohibits production after April 22, 1940. Use of more than $500 worth of materials, other than wooden cabinets, ordered after Feb. 11, 1942, banned. Replacement parts not affected.

L-46: Electric Power, effective Feb. 27, 1942. Provides for integration of generating systems by utilities and industries and curtailment of consumption in Niagara frontier area in event of power shortage.

L-48: Light Aircraft, effective Feb. 17, 1942. Covers new planes built after Sept. 30, 1941, flown less than 100 hours and using engines of less than 500 horsepower. Sales, other than to government agencies and Allied nations, prohibited, unless approved by Director of Industry Operations. Prohibits start of manufacture of light planes, if ribs are aluminum and airframe contains more than 18% aluminum, or if ribs are other material and airframe has more than 12% aluminum. After Sept. 1, 1942, manufacture limited to planes with airframe content of 12% aluminum, regardless of rib material.

L-49: Beds, Springs, Mattresses, effective March 20, 1942. Requires manufacturers consuming 500 tons or more of steel in year ended June 30, 1941, to cut use in second quarter 35% to 60%, depending on product. Users of 100 to 500 tons cut 25% to 50%. Others cut 15% to 40%.

L-50: Telephone Industry, effective March 2, 1942. Limits changes in equipment and facilities of telephone companies. Bans conversion of manual offices, replacement of existing instruments of users unless beyond repair, installation of extension phones in residences.

L-52: Bicycles and Parts, effective March 12, 1942. Until March 31 production limited to 42 per cent of number of

bicycles built in corresponding 1941 period. No bicycles may weigh more than 45 pounds. Production of juvenile models prohibited after April 1. No models after April 1 may weigh more than 31 pounds. Output April 1 to June 30 limited to 42 per cent of 1941 average monthly rate. Metals used in manufacture limited generally to iron, unalloyed steel, silver and gold. L-52-a, effective April 2, 1942, prohibits sales of new adult bicycles, pending start of rationing.

L-53: Track-laying Tractors, effective Feb. 19, 1942. Includes bulldozers, power control units, winches, etc. Prohibits producers and distributors from selling unused tractors or equipment, except against orders received prior to Feb. 19 and carrying rating higher than A-2, L-53-a, April 9, 1942, bans production of 17-35 horsepower tractors Sept. 1. Meanwhile Allis-Chalmers and Caterpillar may build 1000 each. International Harvester 600, Cleveland Tractor 435.

L-54: Typewriters, effective March 6, 1942. Prohibits delivery of new and used units, except for repairs, pending OPA rationing. L-54-a, March 17, 1942, cuts standard model production by five largest makers from March 15 to May 31 25% below 1941 average sales rate. Woodstock cut 10%. June reductions 47% and 25%, respectively. Production of portable models cut 64% through May 31, 89% in June. Makers must earmark 68.5% of output for Army, Navy, balance to be distributed under WPB instructions. Included wide-carriage machines.

L-54-b: Office Machinery, March 15, 1942, halts purchase, sale and rental of new office machinery except to persons with preference rating of A-9 or higher issued on PD-1A or PD-3A certificates. Wide carriage typewriters and shorthand writing machines excluded.

L-55: Shotguns, effective Feb. 23, 1942. Prohibits delivery of 12-gauge guns except to agencies and officers of federal, state and local governments and for lend-lease. Limits shotgun production in other than 12-gauge size to one-half average 1940 rate. Prohibits use of machinery suitable for making 12-gauge guns in turning out shotguns of other sizes.

L-56: Fuel Oil Consumption, effective March 14, 1942. Forbids fuel oil delivery in 17 eastern states, District of Columbia, Oregon and Washington, for use in new equipment unless installation completed within 30 days, or in converted facilities unless conversion completed within 10 days. Permitted for new structures if foundations completed within 30 days and oil-burning equipment originally specified.

L-57: Gas Masks and Anti-Gas Devices, effective March 3, 1942. Prohibits manufacture or sale of such items for protection against enemy attack, unless ordered by government agency and built to Army Chemical Warfare Service specifications. Prohibits sale or delivery of materials for use in unapproved masks. Does not apply to masks for non-military purposes.

L-58: Sextants, effective March 11, 1942. Prohibits sales except to government agencies, to buyers who have obtained a certificate from the Coast Guard, and to dealers. Imports from Great Britain prohibited unless approved by Lend-Lease Administration.

L-59: Metal Plastering Bases, effective March 25, 1942. Producers who used 14,000 tons or more of metals in 1941 required to cut metal consumption 50% below 1940-41 average rate. Zinc use cut 65%. Smaller producers cut all metal use 25%, zinc 50%. Covers accessories as well as lath, etc.

L-60: Pistols, Rifles, Shotguns, effective Feb. 27, 1942. Prohibits disposition of new guns, except sales to federal, state, local and Allied governments and for Lend-Lease. Sellers must report their inventories within 45 days.

L-61: Rubber Machinery, effective March 11, 1942. Prohibits manufacture or sale of equipment used to retread or recap rubber tires except on orders rated by Director of Industry Operations on PD-1A. Does not apply to repair parts.

L-62: Metal Household Furniture, effective March 20, 1942. Covers items with more than 5% metal content by weight (other than nails, other joining hardware). Until May 31 iron and steel consumption by larger manufacturers cut 45% to 65% from average rate in year ended June 30, 1941. Smaller companies cut 30% to 50%, using not over 23 tons in March, 19 in April, 16 in May. All production banned after May 31.

L-63: Suppliers' Inventories, effective April 6, 1942, revoking M-67. Covers wholesalers, distributors, jobbers, dealers and retailers furnishing automotive, aviation, builders, construction, dairy, electrical, farm, foundry, grain elevator, hardware, health, industrial, plumbing and heating, railroads, refrigeration, restaurant, textile mill, transmission, welding and cutting supplies from stock. Limits inventories in eastern and central time zone to twice dollar value of stock shipments in second preceding month; in other zones to 100% of stock shipments two months earlier. Permits acquisition of seasonal lines equal to purchases in peak season of not over 90 days in previous year. Suppliers must record inventories and sales on PD-336 for WPB inspection. Exempted are suppliers with total inventory of less than $20,000 or with inventory of each type of supplies of less than $10,000.

L-64: Burial Equipment, March 28, 1942. Iron and steel use in making caskets, shipping cases and burial vaults cut 20% in April, 50% in May, 75% in June from average 1940 rate. All use of other metals, except gold and silver, banned immediately; iron and steel use permitted after June 30 only for hardware and metal liners.

L-65: Domestic Electrical Appliances, March 30, 1942. Until May 31, 1942, production permitted up to 25% of total 1941 output, provided appliances contain no more than 15% by weight of electrical resistance material used in 1941. Production after May 31 limited to orders rated A-2 or better. Effective immediately, start of processing of pig tin, alloy steel, aluminum, copper or copper alloy banned. Nickel not permitted for plating after March 31, 1942. Making of replacement parts not restricted. Use of electrical resistance material limited to parts in stock and to 15% of 1941 consumption.

L-67: Lawn Mowers, effective March 30, 1942. Second quarter use of iron and steel in making mowers, except for cutting crops, limited to 50% of amount used in corresponding 1941 period or 50% of average 1941 quarterly use. Production banned after June 30, 1942.

L-68: Garment Closures, Associated Items, effective April 1, 1942. Limits use of steel, zinc or zinc alloy in making slide fasteners or parts to 50% of rate for year ended June 30, 1941. Bans use of copper or copper alloy and restricts length of slide fasteners to 10 inches, except for trousers (may be 12 inches) and work jackets (may be 20 inches). Prohibits manufacture or delivery of slide fasteners made of steel, zinc, copper or their alloys for use on any of 32 specified articles. Bans copper use in making hooks, eyes, snap fasteners, buttons and other types of closures and restricts use of steel and zinc except in filling government orders.

L-69: Bright Work on Vehicles, effective March 14, 1942. Prohibits use of bright work on all types of motor vehicles and trailers, including replacement parts and accessories other than ventilator window latches, external locks, cylinder caps and covers, windshield wipers and body trim screws.

L-70: Motor Fuel, effective March 19, 1942. Curtails by 20% gasoline deliveries to service stations and bulk consumers in 17 eastern states, District of Columbia, Washington and Oregon. Service station operations in curtailment areas limited to 12 hours daily, 72 hours a week. Deliveries cut April 16 to 66⅔% of December, January, February average.

L-71: Flashlights, effective April 1, 1942. Bans use of aluminum, chromium or nickel in making cases or batteries. Tin may be used only in solder, iron and steel only in reflectors, contact fittings, battery top seals, battery outer jackets, rivets, end caps and end ferrules.

L-72: Razors and Blades, effective March 25, 1942. Safety razor production ensuing 90 days limited to 70% of 1940 average rate, blades and straight razors to 100% of 1940 rate. Copper consumption in making safety razors ensuing 60 days restricted to 30% of 1940 rate, thereafter to plating only, not over .0004-inch thick.

L-73: Metal Office Supplies, March 28, 1942. Except for wire staples, iron and steel use cut 20% to 50% from rate in 1940. Use of any copper, tin, nickel, chromium, cadmium or crude rubber prohibited unless processing started. Zinc use limited to galvanizing necessary for practicable use. Manufacturers must follow federal specifications issued by Director of Procurement.

L-77: Metal Windows, effective March 25, 1942. Restricts production of metal window framework to orders with rating better than A-2 unless manufacture started before March 25. Sales limited to orders with A-10 or better rating.

L-78: Fluorescent Lighting Fixtures, effective April 2, 1942. Prohibits manufacture or assembly of fixtures or parts except on orders rated A-2 or better. Permits assembly of parts made entirely from materials acquired by A-2 rating or through rating assigned by Production Requirements Plan. Effective June 1, sales other than repair parts, limited to orders rated A-2 or better.

L-80: Outboard Motors, March 27, 1942. Halts production except for specified government agencies. Spare parts output limited to 75% of 1941 rate. Manufacturers' stocks of motors of 6 horsepower and more frozen for disposal to government.

L-81: Toys and Games, April 1, 1942. During second quarter 1942, in making

items containing by weight more than 7% of iron, steel, zinc or rayon, consumption of such materials limited to 25% of average quarterly use in 1941. All use banned after June 30, 1942. Effective immediately no "Prohibited Materials," including alloy steels, chromium plating, copper, silk and various other materials, may be used if in raw form to make toys or games.

L-83: Industrial Machinery, effective April 9, 1942. Prohibits filling orders for certain types of new or used machinery, except for specified government agencies, United Nations, Lend-Lease or on A-9 or higher rating issued on original PD-1, PD-1A or P-19-h certificate or on PD-3 or PD-3A certificate countersigned before April 9. Exempts certain orders involving less than $200 and parts worth less than $1000. Parts costing more than $1000 not restricted in event of actual breakdown of machinery.

L-84: Electric Heating Pads, effective April 4, 1942. Limits 1942 production to 50% of 1940 output, hospital type to 100%. Permits rubber use in pad only in latter type. Prohibits use of chromium and resistance material containing more than 50% nickel. Limits use of resistance material per unit to 1940 rate.

L-85: Feminine Apparel, issued April 8, 1942.

L-86: Liquified Petroleum Gas Equipment, effective April 8, 1942. Prohibits installations with following exceptions: Material for maintenance or repair of existing equipment; installations started prior to Jan. 14, 1942, and completed by May 15, 1942; installations in use prior to April 1, 1942, and subsequently withdrawn from use; containers exchanged in normal course of distribution; installations authorized by WPB. Application for such authority made on PD-397.

L-95: Sanitary Napkins, effective April 9, 1942.

L-98: Golf Clubs, effective April 9, 1942. Prohibits use of iron, steel, other critical metals, plastics and cork in making golf clubs after May 31. Meanwhile iron and steel use limited to 50% of 1941 average consumption, use of other critical metals, plastics, cork banned April 9.

L-97: Railroad Locomotives, effective April 4, 1942. Freezes finished units in producers' hands and prohibits production except in accordance with schedules issued by WPB. L-97-a, April 4, applies same regulations to railroad cars.

L-102: Used Generators and Steam Boilers, effective April 11, 1942. Prohibits sale, lease or option of used electric generating equipment or used steam boilers without authorization from Director of Industry Operations unless value is les than $1000.

RATIONING ORDERS

No. 1: Tires, effective Dec. 30, 1941. Except on government orders sale or purchase of new tires or tubes for automobiles, trucks, busses, motorcycles and farm implements permitted only when old units cannot be renewed and for only the following: Vehicles used principally for professional services of physicians, surgeons, veterinaries, visiting nurses; ambulances; fire fighting equipment; public police vehicles; vehicles of public health and safety departments; garbage disposal and other sanitation service equipment; mail vehicles; public passenger carriers; vehicles for transportation of ice, fuel, waste and scrap material, material for building and maintaining public roads, public utilities and industrial production facilities; roofing, plumbing, heating and electrical repair services; transportation of raw materials, semifinished and finished products, except to ultimate consumer for personal use; common carriers; farm and industrial equipment, other than autos and trucks, where rubber is essential. Purchases must be approved by Tire Rationing Board. OPA Form No. R-1 used to apply for authority to purchase new tires and tubes. Form No. R-2 issued by tire rationing board; R-3 used in making mail-order purchase.

Revision, effective Feb. 19, 1942, places retreaded and recapped tires under rationing regulations. Certificate for bus and truck tires issued starting Feb. 23, those for passenger cars starting April 1.

No. 2: Automobiles, effective Feb. 2, 1942. Provides for release of new passenger cars purchased, but not delivered, before sales were banned Jan. 1. Applications must be filed by March 2. Rationing boards issue certificates, starting March 2, to new buyers. Eligible buyers practically same as those listed in Order No. 1.

Motor Trucks—See M-100.

No. 4: New and Used Typewriters, effective March 25, 1942. Application on R-401 for purchase after April 12 must be approved by Local Rationing Board. Eligible buyers of non-portable units are builders for cantonments, shipyards, air bases; and plants whose war contracts the three preceding months are 70% of all billings and unfilled orders. Portables available to plants with A-3 or better rating on 60% of its billings and orders. Rentals not restricted. Maximum used typewriter prices set by OPA Temporary Price Regulation No. 9 at highest prices in effect March 5, 1942.

MISCELLANEOUS ORDERS

Priorities Regulation No. 1. Defense orders must be accepted unless impossible because of previous defense orders, or if buyer will not conform to established prices, or if orders specify delivery within 15 days and such delivery would require termination before completion of an existing production schedule. Delivery under defense orders must be made before other orders, but no earlier delivery date shall be specified in any defense order than required by the schedule of the person placing the order. Material obtained under allocation or preference rating may be used only for the purpose specified. Inventories must not be increased beyond current needs. Records must be kept for not less than two years of inventories of material covered by preference orders and details of all transactions in such materials. Records are subject to inspection by WPB. Effective Aug. 27, 1941.

Amendment effective Dec. 23, 1941, requires acceptance of B rated orders before unrated orders. Inventory restrictions tightened further. All defense orders not otherwise rated take A-10 rating.

Priorities Regulation No. 2, effective Sept. 9, 1941. Makes all preference ratings mandatory and legally enforceable. Validates rating assignments when stamped by Priorities Director on face of application.

Priorities Regulation No. 3, effective Feb. 2, 1942, amended Feb. 25. New Forms PD-1a and PD-3a are substituted for PD-1 to PD-5 inclusive for assignment of individual ratings. Use is optional until March 15, required thereafter. PD-1a used to make specific applications for materials not provided for by general preference orders. Ratings are assigned on form itself when approved by Dir. of Indus. Oper. PD-2 will not be replaced. Ratings under PD-1a may be extended. PD-3a, used for ratings for government orders, replaces PD-3, PD-4, PD-5, and ratings may be extended. Ratings not to be used to obtain capital goods but may be used to replace inventories consumed in filling rated orders. AA ratings may be extended only as A-1-a if order can be filled from inventory.

Priorities Regulation No. 4, effective Jan. 26, 1942. Validates all preference rating certificates issued by Division of Priorities, OPM, to continue effective until expiration or until cancelled by Director of Industry Operations, WPB.

Priorities Regulation No. 5, effective Feb. 5, 1942. Reproduction of all priority forms and orders permitted, with following exceptions: PD-1-c, PD-3, PD-3A, P-25-a through P-25-e, P-26-a through P-26-e, and P-35 may be reproduced only for purposes of information and marked "Specimen Copy" P-3, P-4, P-9-a through P-9-g, P-13, P-15, and P-52 may be reproduced only by or for producers (not suppliers) operating under said orders. Reproduction of P-41 limited to persons entitled to apply the rating.

Priorities Regulation No. 6, effective Feb. 11, 1942. Abolishes Priorities Critical List of Army and Navy Munitions Board as limitation upon application of ratings assigned by various preference orders.

Priorities Regulation No. 7, Feb. 17, 1942. Permits use of facsimile signature when assignment or extension of preference ratings requires endorsement on purchase orders.

Priorities Regulation No. 8, March 16, 1942, discontinues reports on various PD forms.

INDEX OF ORDER FORMS

For information on use of following forms please refer to digests of the specific orders printed on Pages 3-15 of this section

PD-1A (Application for Rating)
PD-1c (Rating for Ship Repair Yards)
PD-3a (Army, Navy, Government Rating Cert.)
PD-6 (Report of Applications of Preference Ratings Made)
PD-6a (Alternative Form to PD-6)
PD-7 (Polyvinyl Chloride) M-10
PD-7 (Synthetic Rubber) M-13
PD-8 (Aluminum Priority Rating Index) M-1
PD-9, a, b, c (Tungsten) M-29
PD-25A, 25F (Production Requirements) M-90
PD-25X (Modified Prod. Req.) P-90
PD-26a (Aluminum) M-1f
PD-26m (Magnesium) M-2
PD-27 (Nickel) M-6
PD-32 (Steel Products) M-21
PD-33 (Synthetic Rubber) M-13
PD-33 (Polyvinyl Chloride) M-10
PD-34 (Steel Products) M-21
PD-35 (Steel Products) M-21
PD-36 (Synthetic Rubber) M-13
PD-36 (Polyvinyl Chloride) M-10
PD-39 (Aluminum) M-1a
PD-40a (Aluminum) M-1f
PD-40m (Magnesium) M-2
PD-49, 49a (Rubber) M-15
PD-50a (Zinc) M-11
PD-51 (Cork) M-8a
PD-53a (Chromium) M-18a
PD-59a (Copper) M-9, M-9a
PD-60b (Copper) M-9, M-9a
PD-61 (Copper) M-9, M-9a
PD-62 (Zinc Oxide) M-11
PD-63, 63a (Defense Projects) P-19
PD-64a (Locomotives) P-20
PD-65a (Locomotive Repairs) P-21
PD-66, a (Lead) M-38
PD-68, 68a (Defense Projects, Critical) ..... P-19a, b
PD-69 (Pig Iron) M-17
PD-70 (Pig Iron) M-17
PD-71, a, b, c (Pig Iron) M-17
PD-72 (Calcium-Silicon) M-20
PD-73 (Steel Products) M-21
PD-76 (Copper Allocation Certificate) M-9
PD-79 (Health Supplies) P-29
PD-81 (Monthly report of preference rating assignments against various P orders, including P-19e, 29, 65, 82, 86, 87, 95).
PD-82 (Application for preference rating for deliveries of scarce materials necessary for defense products against various P orders, including P-65, 75, 79, 83, 85, 86, 101)
PD-82a (Petroleum Industry Supplies) P-83
PD-83, a, b, c, d, e, f (Warehouse Steel) M-21b
PD-84 (Vanadium; see 209a, b) ..... M-23, a
PD-88 (Application for Preference Rating Order against various P orders, including P 42, 43, 53)
PD-93 (Laboratory Supplies) P-43
PD-94 (Zinc) M-11
PD-96 (Air Transportation Facilities) P-47
PD-99 (Steel Output, Capacity Report) M-21
PD-100 (Steel Allocation, Rolling Sched.) M-21
PD-101 (Tungsten Tool Steels) M-14
PD-102, a (Rayon Yarn) M-37a
PD-105, b (Defense Housing) P-55
PD-106 (Allocation of Rayon Yarn) M-37
PD-107 (Chemicals) P-43
PD-110 (Cotton Linters, Seed) M-12
PD-118 (Utilities) P-46
PD-119 (Mines) P-56
PD-120 (Dealer Scrap Inventories) M-9b
PD-121a, b (Copper Scrap Inventories) M-9
PD-123, a (Copper, Copper Alloy Req.) M-9a
PD-123b (Copper, Copper Alloy Del.) M-9a
PD-124 (Lead) M-38
PD-126 (Copper Scrap) P-61
PD-127 (Chlorinated Solvents) M-41
PD-128 (Board Fibers) M-36
PD-130 (Copper, Copper Alloy Scrap) M-9b
PD-134, b (Metal Office Furniture) L-13
PD-135 (Building Projects) P-71
PD-136 (Metal Office Furniture) L-13
PD-143, 144 (Chlorinated Rubber) M-46
PD-145, 146 (Titanium Pigments) M-44
PD-148 (Steel Plant Maintenance) P-68
PD-149 (Iron, Steel Scrap Producer) M-24
PD-150 (Iron, Steel Scrap Consumer) M-24
PD-151 (Iron, Steel Scrap Dealer) M-24
PD-152 (Cobalt) M-39
PD-153 (Cobalt) M-39
PD-154a (Reservation of Container Steel) M-45
PD-155a (Authorization to Process Container Steel) M-45
PD-156a (Application for Preference Rating) P-76
PD-156 (Steel for Drums) P-76
PD-157 (Rebuilt Machine Tools) P-77
PD-158, b, c, (Chlorine) M-19
PD-159, a, b, c (Chlorine) M-19
PD-160 (Freon Requirements) M-28
PD-162 (Chlorinated Hydrocarbon Refrig.) M-28
PD-166 (Blind-made Products) P-82
PD-167 (Copper Conservation) M-9c
PD-169 (Steel Plates) ..... Allocation 1
PD-170 (Vacuum Cleaners) L-18
PD-172 (Copper Conservation) M-9c
PD-173 (Magnesium and Products) M-2b
PD-174 (Magnesium Powder) M-2b
PD-175 (Copper, Copper Alloy Products) M-9-c
PD-176 (Ice Refrigerators) L-7
PD-177 (Ice Refrigerators) L-7
PD-178a, b (Phenols) M-27
PD-179 (Rebuilt Machine Tools) P-77
PD-180 (Phenols) M-27
PD-182 (Amusement Machines) L-21
PD-183 (Plates, Welding Electrodes) P-92
PD-186, 7, 8 (Burlap) M-47
PD-189 (Copper, Copper Alloy Products) M-9c
PD-190, 1 (Chlorine) M-19
PD-192 (Cooking Appliances) L-23
PD-200 (Application for Project Rating) P-19
PD-200a (Project Material List) P-19
PD-206 (Sugar) M-55
PD-209a, b (Vanadium) M-23a
PD-201 (Allocation by WPB of certain strategic materials)
PD-211 (Iridium) M-49
PD-212 (Smelter Maintenance) P-73
PD-213 (Tin Allocation) M-43
PD-214 (Oil Industry Materials) M-68
PD-216 (Tires) M-15c
PD-217 (Bristles) M-51a
PD-221 (High Chromium Steel) M-21d
PD-222a (Strategic Material Imports) M-63
PD-223, 224 (Toluene) M-34
PD-226 (Copper Scrap) M-9b
PD-228 (Steel Plant Maintenance) P-68
PD-229 (Tin) M-43a
PD-234 (Lead) M-38c
PD-235, 236 (Jewel Bearings) M-50
PD-238 (Sodium Nitrate) M-62
PD-248 (Smelters, Refiners) P-73
PD-249 (Scrap Metals) M-9b, M-72
PD-251, 2, 3 (Asbestos) M-79
PD-254 (Tin, Lead Scrap) M-72
PD-259 (Copper) M-9c-1
PD-260 (Copper) M-9c-1
PD-263 (Diphenylamine) M-75
PD-269 (Tin, Terne Plate) M-81
PD-275 ..... Metals Industry Survey
PD-277 (Chlorine) M-19
PD-279 (Sugar) M-55
PD-285 (Canning Plants) P-115
PD-293 (Corundum) M-89
PD-295, 296 (Rhodium) M-95
PD-298, 299 (Steel Plates) M-21c
PD-303A, B (Flake Graphite) M-61
PD-307, 8 (Shot and Bullet Core Steel) M-21f
PD-310 (Truck Rationing) M-100
PD-312 (Aluminum Pigment) M-1-g
PD-313 Aluminum Pigment) M-1-g
PD-325 (Mica) M-101
PD-334 (Shellac) M-106
PD-336 (Inventories) L-63
PD-352 (Railroad Material) P-88
PD-355 (Palm Oil) M-59
PD-358, 359, 360 (Molybdenum) M-110
PD-361, 362, 363 (Glycerine) M-58
PD-371 (Aluminum, Magnesium Plants) P-120
PD-372 (Aluminum, Magnesium Plants) P-120
PD-376, 377, 378 (Diamonds) M-109
PD-380, 381 (Antimony) M-112

FORMS AVAILABLE—Most of the above Allocation and Preference Order Forms may be reproduced (see Priorities Regulation No. 5, Page 15) and may be obtained promptly at nominal prices. Readers should direct inquiries to STEEL, Readers Service Department, Penton Building, Cleveland, Ohio.

PRICE SCHEDULES

Issued by the Office of Price Administration, Temporary Building "S"
Jefferson Drive, Washington, D. C.
Telephone Republic 7500

No. 1—Second-hand machine tools issued Feb. 17, 1941, effective March 1, 1941; amended Sept. 24, 1941. Maximum prices in terms of percentage of March, 1941 equivalent of new tools: Constructed before Jan. 1, 1920, rebuilt 70%, others 50%; Jan. 1, 1920-Dec. 31, 1929, rebuilt 80%, others 60%; Jan. 1, 1930-Dec. 31, 1935, rebuilt 90%, others 70%; Jan. 1, 1936 and after, rebuilt 95%, others 75%.

No. 2—Secondary aluminum and scrap, effective March 24, 1941; amended June 3, Aug. 14 and Nov. 1, 1941; correction May 5, 1941. Amended, effective Jan. 13, 1942, covering segregated plant scrap. Amended Feb. 26, 1942, to exempt from the schedule excessive inventories of aluminum products purchased by Metals Reserve Co.

Secondary ingot, cents per lb. lots of 30,000 lbs. or more, f.o.b. shipping point: 98 per cent pure and silicon alloys 15.00; No. 12 and piston alloys 14.50; deoxidizer 13.50. Add ¼-cent for 10,000-30,000 lbs.; ⅛-cent 1000-10,000 lbs.; 1 cent under 1000 lbs.

Scrap, in cents per lb., f.o.b. point of shipment, for lots of less than 1000 lbs., 1000-20,000 lbs. and 20,000 lbs. or over, respectively: Plant Scrap—segregated 2S clips or other 2S solids, 10.00, 11.00, 11.50; mixed clips or other mixed solids, 8.50, 9.50, 10.00; segregated borings and turnings, 7.50, 8.50, 9.00; mixed borings and turnings, 6.50, 7.50 8.00. Obsolete Scrap—pure cable, 10.00, 11.00, 11.50; old sheet and utensils, 9.50, 10.50, 11.00; old castings and forgings, 10.00, 10.50, 11.00; pistons free of struts, 10.00, 10.50, 11.00; deduct 2 cents for pistons with struts.

Note: Above 1000 to 20,000-lb. prices apply on truck shipments or 1000-lb. to minimum carload rail shipments. Prices for 20,000 lbs. or more apply when shipped by truck, or minimum carload by rail.

No. 3—Secondary zinc and scrap, effective March 31, 1941; amended Oct. 17, 1941, Feb. 2, 1942. Secondary zinc, cents per lb., carlots, E. St. Louis: 8.25, for prime western and poorer grades, 8.35 for selected, 8.50 for brass special, 8.75 for intermediate and higher. Producers' quantity extras: 0.15c for 20,000 lbs. to carload; 0.25c for 10,000-20,000 lbs.; 0.40c for 2000-10,000. Other sellers' extras 0.65c, 0.75c, 1.00c and 1.50c respectively. New zinc clippings and trimmings (cents per lb.) 7.25, engravers and lithographers' plates 7.25; old zinc 5.75, f.o.b. point of shipment; add ⅛-cent for single shipments of 10,000 pounds or more. Unsweated zinc dross 5.80; die cast slab 5.80, scrap 4.50, f.o.b. point of shipment; add ¼-cent for single shipments of 20,000 pounds or more. "Single shipment" means deliveries within 48 consecutive hours. Grades may be combined.

No. 4—Iron and steel scrap, effective April 3, 1941; amended May 7, June 18, June 21, Sept. 5, Sept. 22, Sept. 26, Oct. 10, Nov. 24, Dec. 23, 1941, Feb. 2, 10, March 18, 31, 1942.

The maximum price at which any grade of scrap (other than railroad) may be delivered to a consumer wherever located is the shipping point price plus actual transportation charges. Where shipment is by water, dock charges are 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere.

With certain stated exceptions the maximum delivered price shall not exceed by $1 a ton the nearest maximum base price in terms of transportation charges. For instance, Youngstown consumers can draw on the Cleveland area for No. 1 steel scrap by taking the Cleveland base of $19.50, subtracting the Cleveland switching charge of 65 cents and adding freight to Youngstown of $2.08. The resulting delivered figure of $20.93 is within the $1 "springboard" limit over the Youngstown base of $20. "Springboard" limit may be exceeded by amount of freight rate increase March 18, 1942. A shipping point is the point from which the scrap is to be shipped to a consumer. The maximum shipping point price is found by taking most favorable basing point and subtracting the lowest transportation charge. For instance, No. 1 steel shipped from Toledo takes the Detroit base of $17.85 minus transportation of $1.52 or $16.33. This shipping point price is the same to all consumers wherever located. Exceptions are the New England area which must use the Johnstown base minus the all-rail freight from the shipping point to Johnstown, and the Metropolitan Area of New York which must use the Bethlehem base. Where scrap is shipped from a basing point, the shipping point price is determined by taking the basing point price and deducting local transportation costs to consumers located within the basing point. Maximum shipping point price for No. 1 steel at Boston $15.05. Maximum freight on any scrap shipped from New England $6.65 a ton.

Brokers allowed 50-cent commission above maximum prices to consumers. No commission payable for preparation of scrap. Commission must be shown separately on invoice.

Base prices on open hearth grades $20, delivered consumers' plants at Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Weirton, Steubenville, Youngstown, Warren, Canton, Sharon; $18.75 Chicago, Coatesville, Claymont, Conshohocken, Phoenixville, Harrisburg, Sparrows Point; $19.50 Cleveland, Cincinnati, Ashland, Ky., Portsmouth, O., Middletown, O.; $18.25 Kokomo, Ind., Bethlehem, Pa.; $18 Duluth; $17.85 Detroit; $17 Atlanta, Alabama City, Birmingham; $16.50 Minnequa, Colo.; $17, Los Angeles, San Francisco, Pittsburg, Calif.; $14.50 Seattle. For No. 1 railroad heavy melting steel add $1 to above prices at centers which are basing points for railroad grades.

No. 1 cupola cast $18 at shipping points in Montana, Idaho, Wyoming, Nevada, Utah, Arizona, New Mexico; $19 in North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas, Florida; $20 in other states and Kansas City, Kans.-Mo.

Unprepared scrap, except heavy breakable cast, $2.50 per gross ton less than prepared. Unprepared railroad scrap is $3.50 less.

Unprepared scrap excludes graveyard autos and other items requiring dismantling.

High manganese steel scrap takes $7 premium over No. 1 steel when sold for electric furnace use. Machine and shoveling turnings take $4 premium when briquetted; briquetted mixed borings and turnings premium is $3. Railroad steel axles for rerolling or reforging are $6 above No. 1 steel; steel wheels and springs for electric furnace, acid open-hearth or foundry use are $3.50 above No. 1 steel; couplers and knuckles $3 higher. Brake shoes from dealer's yard are $4.75 under No. 1 cupola cast.

Amendment, March 18, 1942, permits addition of 6% freight rate increase to delivered prices.

No. 5—Bituminous coal, issued April 2, 1941 fixing prices at levels prevailing March 28, 1941. Revoked May 1, 1941.

No. 6—Iron and steel products, issued April 16, 1941 freezing basing point prices at levels prevailing March 31, 1941; revised June 20, 1941 to establish base prices at April 16, 1941 levels. Revised Feb. 4, 1942.

Covered are iron or steel ingots, semi-finished products, finished hot or cold-rolled products and all products further finished by galvanizing, enameling, plating, coating, drawing, extruding, etc.

Basing point prices are those announced by (1) U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing point; or (2) those prices announced or customarily quoted by other producers at the same designated points. Exception: Base prices under (2) cannot exceed those under (1) except to extent prevailing in third quarter of 1940. Extras may be applied only if charged during two years prior to April 16, 1941. Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific points are deemed basing points except producers may charge governing basing point prices plus rail rates to the latter two areas where water transportation is not available. Domestic ceiling prices are the aggregate of (1) applicable basing point price (2) extras (3) transportation charges to point of delivery as cus-

tomarily computed. The applicable basing point may be (1) the basing point nearest the consumer providing the lowest delivered price or (2) the basing point at or closest to the place of production or origin of shipment (provided the war emergency requires shipment to be made to place outside mill's usual market area). Contracts drawn prior to April 16, 1941 at other than Schedule prices may be continued until March 15, 1942.

Export ceiling prices may be either the aggregate of (1) domestic basing point nearest place of production (2) export extras (3) export transportation charges or the f.a.s. seaboard price of the U. S. Steel Export Co. on April 16, 1941.

Amendment, March 16, 1942, requires reinstatement of discount of 40 cents per 100 lbs. on sales of bale tie wire. Amendment, March 25, 1942, provides for filing of petitions seeking exception to ceiling prices, in accordance with OPA Procedural Regulation No. 1.

No. 7—Combed cotton yarn, May 26, 1941.

No. 8—Nickel scrap and secondary materials, effective June 2, 1941; amended Sept. 8, 1941. Maximum prices to makers on nickel and nickel alloy scrap unprepared for consumption, cents per lb., f.o.b. point of shipment:

Nickel scrap containing 98 per cent or more nickel, not more than 0.50% copper 26.00 per lb.; 90-98 per cent nickel 26.00 per lb. of nickel contained only. Converters (dealers) allowed 2-cent premium in selling to consumers. Shipments of 2000 pounds or more by maker or converter take ½-cent premium.

Ferro-nickel-chrome-iron scrap containing 20-90 per cent nickel 26.50 per lb. of nickel contained, 8.00 per lb. of chrome. Converter's premium 1½ cents. Quantity extra ½-cent 20,000 lbs. or more.

Ferro-nickel-iron scrap containing 14-90 per cent nickel 26.50 per lb. of nickel contained. Converter's premium 1½ cents. Quantity extra ½-cent 10,000 pounds or more.

Monel metal clippings 20.00 per lb.; soldered sheet 18.00; No. 1 castings, turnings 15.00. Converter's premium 2 cents. Quantity extra ½-cent 20,000 pounds or more. Cupro-nickel containing 90 per cent or more combined nickel, copper 26.00 per lb. of nickel contained, 8.00 per lb. of copper, only. Converter's premium 2 cents. Quantity extra ½-cent 20,000 lbs. or more.

Basic maximums on stainless (add $10 for briquettes) and nickel steel scrap, f.o.b. point of shipment (brokers allowed 5% commission on stainless before $10 briquetting extra, 2% on nickel steels):

Stainless (16-20% chromium, 7-10% nickel) $90 gross ton for sheets, clippings, solids, $60 for borings and turnings.

Other chromium-nickel stainless grades 28.00c per lb. of nickel and 9.50c per lb. chromium contained for sheet, clippings, solids. Deduct $30 gross ton for borings and turnings.

Straight chromium-type sheets, clippings, solids $35 gross ton for 12-14% chromium, $40 for 14-18%, $40 plus 9.50c per lb. for each lb. chromium in excess of 18% for grades containing over 18% chromium. Deduct $5 ton for borings and turnings.

Secondary Monel ingots and Monel shot 27.00c per lb., copper-nickel shot 25.50c.

No. 9—Hides, kips and calfskins, June 16.

No. 10—Pig iron, effective June 24, 1941, freezing prices at levels generally prevailing in second quarter of 1941. Governing basing point prices (gross tons):

No. 2 foundry $25 Bethlehem, Everett, Swedeland, Birdsboro, Sparrows Point; $24 Erie, Neville Island, Sharpsville, Buffalo, Chicago, Granite City, Cleveland, Hamilton, Toledo, Youngstown, Detroit; $24.50 Duluth; $20.38 Birmingham, $22 Provo.

For basic iron deduct 50 cents from above except Duluth and Provo which are not bases. Birmingham base $19, Buffalo $23.

Malleable $25.50, Bethlehem, Everett, Swedeland, Birdsboro; $24.50 Erie, Buffalo, Duluth; $24 Neville Island, Sharpsville, Chicago, Granite City, Cleveland, Hamilton, Toledo, Youngstown, Detroit.

Bessemer $26 Bethlehem, Everett, Swedeland, Birdsboro; $25 Erie, Buffalo, Duluth, Birmingham; $24.50 Neville Island, Sharpsville, Chicago, Granite City, Cleveland, Toledo, Youngstown, Detroit.

Low phos $29.50 Steelton, Birdsboro, Buffalo. High silicon silveries (6.00-6.50% base) $29.50 Jackson County, O., $30.75 Buffalo. Gray forge $23.50 valley or Pittsburgh. Charcoal $28 Lake Superior, high phos. $28.50, Lyles, Tenn., low phos $33 Lyles.

Ceiling prices are aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to place of delivery as customarily computed. Exceptions: Struthers Iron & Steel Co. may charge 50-cent premium, Pittsburgh Coke & Iron Co. at Sharpsville only. Governing basing point is the one resulting in the lowest delivered price for the consumer.

In the case of exports only, basing point nearest place of production may be used. Differentials: Silicon 50 cents for each 0.25 points in excess of 1.75-2.25 base. Phosphorus 38 cents for content of 0.70% and over. Manganese 50 cents for each 0.50% over 1.00%.

No. 11—Cotton textiles, June 28, 1941.

No. 12—Brass mill scrap ("byproduct of fabrication of materials produced by brass mills") effective July 22, 1941; amended Oct. 3, 1941. Maximum prices cents per lb. f.o.b. point of shipment for heavy scrap, rod ends and turnings, respectively: Copper 10.25, 10.25, 9.50; yellow brass 8.62½, 8.37½, 7.87½; 95% plus commercial bronze 9.50, 9.25, 8.75; 90-95% commercial bronze 9.37½, 9.12½, 8.62½; 80% min. red brass 9.12½, 8.87½, 8.37½; 71-80% best qual. brass 8.75, 8.50, (no turn., price); 5% nickel silver 9.25, 9.00, 4.62½; 10% ni. sil. 10.12½, 9.87½, 5⅛; 15% ni. sil. 10.87½, 10.62½, 5⅛. Above prices for less than 15,000 lbs. any kind or grade; add ⅛ cent for 15,000-40,000 lbs. shipped at one time, 1 cent 40,000 or more. Amendment, effective Dec. 27, 1941, permits ceilings to be exceeded through addition of duty on imported metal.

No. 13—Douglas fir plywood, May 1, 1941.

No. 14—Raw silk, Aug. 2, 1941. Revoked Feb. 19, 1942.

No. 15—Copper, effective Aug. 12, 1941; amended Aug. 28, 1941, Feb. 1, 1942. Maximum base prices for electrolytic, lake or other fire refined copper in wire bars or ingot bars made to meet ASTM specification B5-27 for electrolytic and B4-27 for lake 12.00c lb. delivered in carlots Connecticut valley. Casting copper in wire bars or ingot bars fire refined to 99.5% purity, including silver as copper, 11.75c lb., f.o.b. refinery in carlots, 12.00c in less carlots.

Apply usual delivery differentials for other points. Add ⅛-cent on l.c.l. lots of electro, lake or fire-refined purchased from producers. Prices are gross before deduction of discounts and include commissions.

For other kinds, grades, shapes, forms apply customary premiums or discounts in effect Aug. 11, 1941. Other than producers (dealers) may charge following premiums, casting copper excepted: 0.499 lbs. 2c; 500-999 1½c; 1000-4999 1c and 5000 to carload ¾c.

No. 16—Raw sugar, Aug. 14, 1941.

No. 17—Pig tin, effective Aug. 16, 1941; amended Sept. 19, 1941. Prices ex New York dock or warehouse for foreign tin, ex producers plant for domestic. Grade A 99.80% or higher 52.00c lots of 5 tons or more (includes Straits, Banka, Billiton, Katanga, Chempur, Hawthorne refined. Mellanear guaranteed, Lempriere, Pyrmont, Regis, Vulcan Electrolytic, Metal and Thermit refined, No. 1 and electrolytic). Grade B 99.75-99.79% inclusive and 99.80% or higher not meeting grade A specifications 51.62½c. Grade C cornish refined (99.808%) 51.62½c, Grade D 99.00-99.74% pure, inclusive, 51.12½c (includes Chinese, YTC and PKMA brands, English Mellanear L & F brand). Grade E below 99% 51.00c for tin content. For 2240-11,199 lbs. incl., add 1c; 1000-2239 incl. 1½c; 500-999 incl. 2½c; under 500 lbs. 3c. Amendment, March 30, 1942, provides following premiums over maximum prices for export sales: 1c per lb. on 11,200 lbs. or more; 1½c on 2240-11,199 lbs.; 2c on less than 2240 lbs. Cost of packaging and other legitimate charges may be added.

No. 18—Burlap, effective Aug. 16, 1941.

No. 19—Southern pine lumber, Sept. 5, 1941.

No. 20—Copper and Copper Alloy Scrap, effective Aug. 19, 1941, amended Oct. 17, 1941, Feb. 27, 1942. Maximum prices in cents per lb. on material other than of brass mill origin (see No. 12) f.o.b. shipping point, applying on any sale and including all commissions and service charges, grouped for application of quantity differentials: Group 1—No. 1 wire and heavy copper 10.00, No. 2 wire and mixed heavy 9.00, light copper 8.00; Group 2—Bell metal 14.50, high-grade bronze gears and babbitt lined brass bushings 12.75, hard red machinery brass 10.00, soft red brass 9.50, soft red brass borings 9.25, aluminum bronze (Ford) gears 9.00, red brass breakage and red carburetors with iron screws 8.00; Group 3—Unlined standard red car boxes 8.50, lined standard red car boxes 8.00; Group 4—Cocks and faucets 8.25; Group 5—Old rolled brass, brass pipe, and clean fired rifle shells 8.00, Admiralty condenser tubes 7.50. Muntz metal tubes 7.00; Group 6—Yellow brass castings 7.25, heavy yellow brass 7.00, cast yellow brass borings and reflectors 6.75; light brass 6.50, Yellow brass breakage 5.50; Group 7—Automobile radiators 7.50. Following quantity premiums per lb. may be added for shipment at one time within 48 hours, items meaning grades in one group: ⅛-cent for 40,000 pounds or more containing only one item; ¼-cent for 40,000 pounds or more con-

taining not more than three items. Premium of 1-cent per lb. may be added for copper scrap in crucible shape and ¾-cent for crucible copper alloy scrap. Quantity and crucible scrap premiums cannot both be charged on the same sale. Metals Refining Co., Hammond, Ind.; Sherwin-Williams Co., Bound Brook, N. J.; Superior Copper Products Co., Chicago; and Harshaw Chemical Co. authorized to purchase certain tonnages of special purpose copper scrap at 11.25c.

Amendment, Feb. 7, 1942, excepts from price schedule railroad scrap reprocessed under conversion agreements approved by WPB.

No. 21—Formaldehyde, effective Aug. 20, 1941.

No. 22—Pennsylvania grade crude oil, effective Aug. 23, 1941. Pennsylvania Bradford crude per barrel $2.75; Southwest Pennsylvania crude $2.40; Eureka $2.34; Southeastern Ohio $2.30; Oil City-Titusville, group A $2.68.

No. 23—Rayon grey goods, Aug. 24, 1941.

No. 24—Washed cattle tail and winter hog hair, issued Aug. 16, 1941.

No. 25—Fats and oils and their products, effective Aug. 29, 1941, revoked Feb. 23, 1942.

No. 26—Douglas fir lumber, Oct. 1, 1941.

No. 27—Anthracite coal, effective Sept. 12, 1941; revoked Sept. 18, 1941.

No. 28—Ethyl alcohol, effective Sept. 15, 1941. Following revised prices effective Jan. 1, 1942 CD12, CD13, CD14 (188-192) 58c per gallon f.o.b. shipping point in tank cars; in drums, carloads add 3½c per gallon, 19 drums add 6c. 1-18 drums add 9c.

No. 29—By-product blast furnace and foundry coke, effective Oct. 1, 1941, amended Feb. 7, 1942. By-product foundry coke f.o.b. cars at ovens: Alabama $8.50; Chicago $11.50; Ashland, Ky., Ironton, O., Portsmouth, O., Fairmont, W. Va. $10, Detroit, Buffalo, Erie, Pa., Philadelphia $11.75; Kearny, N. J. $12.15; Painesville, O. $11.25; Chattanooga, $9; Milwaukee $12.25. Delivered prices: Chicago, Detroit, Erie $12.25; St. Louis and East St. Louis $12.25 ($12.75 for producers outside Missouri, Alabama, Tennessee); Indianapolis, Terre Haute $12; Buffalo $12.50; Cincinnati $11.75; Cleveland $12.30; Philadelphia $12.38; St. Paul, Minn. $14; New England $13.75, provided freight from Everett not over $3.10, less 15 cents for cash ten days. Amendment defines areas governed by specific oven prices.

By-product blast furnace coke: 75 cents net ton above weighted average f.o.b. oven price in first quarter 1941. Does not apply to sales or shipments at less than $6 f.o.b. after Sept. 18, 1941.

No. 30—Waste paper sold east of the Rocky Mountains, effective Dec. 15, 1941. No. 1 mixed $14 net ton, f.o.b. point of shipment.

No. 31—Acetic acid, effective Sept. 29, 1941.

No. 32—Paper Board sold east of Rocky Mountains, effective Oct. 1, 1941. Maximum delivered prices per net ton: Single Manila Lined board $60, chipboard $45, white patent coated news board $75.

No. 33—Carded cotton yarns, Oct. 6, 1941.

No. 34—Wood alcohol, effective Oct. 10, 1941. Denaturing grade, pure methyl, 95% methyl and 97% methyl alcohol in tank cars 60.00c per gal. East of Mississippi River, 63.00c West. Add 6c per gal. for carloads in drums or other containers.

No. 35—Carded gray and colored yarn cotton goods, effective Oct. 21, 1941.

No. 36—Acetone, effective Oct. 27, 1941. Following revised prices effective Jan. 1, 1942, in cents per lb. delivered in Eastern territory, (add ½-cent for Western territory): 15.8 in tank cars, 16.8 carloads in drums, 17.3 less carloads in drums. Eastern territory includes New Mexico, Colorado, Wyoming, Montana and states east thereof.

No. 37—Normal Butyl Alcohol (butanol), effective Oct. 27, 1941. Following revised prices effective Jan. 1, 1942, in cents per lb. delivered in Eastern territory (add ½-cent for Western territory): 15.8 in tank cars, 16.8 carloads in drums, 17.3 less-carloads in drums. Territories same as in No. 36.

No. 38—Glycerine, effective Nov. 10, 1941. Base maximum prices of 11.50c per lb. for crude glycerine (80 per cent glycerol) and 18.00c per lb. for refined type.

No. 39—Upholstery furniture fabrics, effective Nov. 10, 1941.

No. 40—Builders hardware, effective Nov. 19, 1941. Maximum prices for manufacturers and jobbers are highest levels prevailing during 15-day period ended Oct. 14, 1941. Includes insect screen as well as such items as knobs, locks, hinges, etc. Steel insect screen eliminated, Jan. 16, 1942.

No. 41—Steel castings, effective Dec. 1, 1941. Maximum prices are those prevailing on July 15, 1941. Amendment, Feb. 3, 1942, places ceiling for railroad specialties at Oct. 1, 1941, levels. Amendment, effective March 16, 1942, permits producers of railroad specialty castings to charge for certain extras, coupler repair parts and pattern costs customarily charged between Oct. 1-15, 1941.

No. 42—Paraffin Wax, effective Dec. 1, 1941.

No. 43—Used steel barrels or drums, effective Dec. 1, 1941, amended Jan. 10, Feb. 2, 1942. Reconditioned units, 14-16 gal., $1.45; 29-33 gal., $1.85; 50-58 gal., $2.25, delivered within 50 miles of reconditioning plant. For each 75 miles or fraction add transportation cost, or 5, 7½ or 10 cents, respectively, for three capacity classifications. Further addition of 15, 25 or 50 cents allowed in California, Washington and Oregon. Reconditioned lined drum suitable as food container takes 15, 20 or 25 cent premium. Maximums for raw used drums bought direct from emptier $0.75, $1 or $1.23. Add 10, 20 or 40 cents in California, Washington and Oregon. When bought from other than emptier, raw used drum maximums are $1, $1.30 or $1.60. If buyer makes own pickup deduct 5, 7½ or 10 cents. Add 10, 20 or 40 cents if raw used drum bought and delivered or picked up in California, Washington or Oregon.

No. 44—Douglas fir doors, Dec. 10, 1941.

No. 45—Asphalt or tarred roofing products, effective Dec. 12, 1941.

No. 46—Relaying rails, effective Dec. 2, 1941. Maximum price for rails 35 pounds or heavier originating from Class I railroads, switching or terminal companies, $28 per gross ton, f.o.b. any station on the railroad. Dealers or jobbers may charge $30 in resale. Originating other points $30 minus lowest rail freight to base nearest shipping point, but no less than $24. Basing points are Boston, Philadelphia, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, Savannah, Ga., Norfolk, Va., Duluth, St. Louis, Birmingham, Houston, Los Angeles, San Francisco, Portland, Oreg., Seattle, Denver. Maximums on warehouse sales $32 a gross ton in carlots; $2 per 100 lbs. for 5 tons to carload; $2.25 for less than 5 tons. Maximum agent's commission $1 a ton. Operation of recognized warehouse must be declared to OPA by Dec. 10, 1941. Contracts made before Feb. 7, 1942 at not over $1.60 per 100 lbs. warehouse, for 25 tons and over may be filled if completed by March 15, 1942.

No. 47—Old rags, effective Dec. 9, 1941.

No. 48—Flashlights, batteries, bulbs, effective Dec. 10, 1941. Maximums are highest prices quoted Oct. 1 to Dec. 1, 1941. Revoked, Feb. 4, 1942.

No. 49—Iron and Steel Products at Resale, effective Dec. 15, 1941, amended Jan. 30, Feb. 2, 1942. Fixes prices generally at levels prevailing April 16, 1941. For cold-drawn and seamless tubing use prices charged by National Tube Co. distributors; for tool steels Crucible Steel Co. prices. For less-carload lots of standard nails, annealed and galvanized wire for local delivery use mill carload price (minus 15c jobber allowance) add carload freight to warehouse, plus additions of 50c for nails, 60c for annealed wire, 68c for galvanized wire. For outside delivery add less-carload freight. Markup on export sales of all products is limited to 5% for agents, 10% for merchants.

Amendment, March 28, 1942, permits addition of storage charges to export prices of material acquired prior to Dec. 15, 1941, and held because of failure to secure shipping space; also of material shipped to port of exportation prior to March 1, 1942, and subsequently stranded. Provides for export shipments in exceptional cases where Board of Economic Warfare certifies above-ceiling price is necessary.

Amendment, March 31, 1942, allows sellers of merchant wire products at least a 20% mark-up over mill carload delivered prices. Establishes following freight allowances for products sold on Pacific coast to reflect wartime use of all-rail shipments: 75 cents per 100 lbs. on plates, 65 cents on hot and cold rolled sheets, 45 cents on structurals and galvanized sheets, 25 cents on hot rolled strip, 20 cents on hot rolled merchant bars. Also clarifies status of retailers and sets up simpler procedure for seeking exemption to schedule.

No. 50—Green coffee, effective Dec. 11, 1941.

No. 51—Cocoa Beans and Butter, Dec. 11, 1941.

No. 52—Pepper, effective Dec. 11, 1941.

No. 53—Fats and Oils, effective Dec. 13, 1941.

No. 54—Douglas Fir Peeler Logs, effective Dec. 20, 1941.

No. 55—Second hand textile bags, Dec. 16, 1941. Replaced March 30, 1942, by new schedule setting prices according to size of bag and weight of material.

No. 56—Reclaimed rubber, Dec. 20, 1941. Maximums are highest prices received Nov. 5 to Dec. 5, 1941.

No. 57—Wool floor covering, Dec. 16, 1941. Ceiling is 105% of Oct. 13, 1941 prices.

No. 58—Wool, wool tops, yarns, Dec. 18, 1941.

No. 59—Kapok, Dec. 18, 1941.

No. 60—Direct consumption sugars, effective Dec. 22, 1941.

No. 61—Leather, effective Dec. 29, 1941. Maximum prices are highest prevailing levels between Nov. 6 and Dec. 6, 1941.

No. 62—Cigarettes, effective Dec. 30, 1941.

No. 63—New Rubber Tires & Tubes, effective Jan. 5, 1942. Establishes maximum prices at retail. Typical prices: 4-ply passenger 6.00 x 16 $14.75, 6.50 x 16 $17.90; 10-ply truck 8.25 x 15 $68.50, 7.50 x 18 $62.10, 8.25 x 18 $65.75, 9.00 x 18 $78.10; 10.50 x 18 $106.00, 7.00 x 20 $47.50, 7.50 x 20 $63.40; 9.00 x 20 $80.75.

No. 64—Domestic cooking and heating stoves, effective Jan. 5, 1942. Maximums for regular line stoves are 112% of lowest price quoted by manufacturers from Jan. 15 to June 1, 1941. For private brands maximums are 112% of lowest price charged during same period.

No. 65—Resale of floor coverings, effective Jan. 5, 1942. Ceiling is Oct. 1-Oct. 13, 1941 prices for material received by seller prior to Jan. 2, 1942. Material received after Jan. 2 takes current prices of manufacturer to retailers.

No. 66—Retreaded, Recapped Tires, effective Jan. 19, 1942. Establishes maximums for retreading, full capping, or top capping with different grades of camelback and varying tread depth. For example, 6.00 x 16 passenger tire is $7.50 for tread depth 12/32-inch or more, $7 for tread depth 5/16 to 11/32, $6.50 for depth less than 5/16, when using camelback market price of which is 26 cents per pound or over. These prices 55 cents less for camelback 21 to 26 cents.

No. 67—New machine tools, effective Jan. 21, 1942. Maximum prices for dealers and manufacturers are Oct. 1, 1941 lists or, in absence of such list, last price at which similar articles sold between Jan. 1 and Oct. 1, 1941. Amended, March 13, 1942, to permit Niagara Machine & Tool Works, Buffalo, to exceed its Oct. 1, 1941, list prices for three machine tools which it manufactures. Amendment, March 28, 1942, grants exemptions on certain tools to Stokerunit Corp., Milwaukee; Fox Grinder Inc., Pittsburgh; Niagara Machine & Tool Works, Buffalo. Amendment, April 7, authorizes Norton Co., Worcester, Mass., to raise price of 150 Model No. 26 Hydrolap machines from $7025 to $7290 each.

No. 68—Hide glue stock, Jan. 20, 1942.

No. 69—Primary Lead, effective Jan. 15, 1942. Maximums in cents per pound in carloads delivered St. Louis: Pigs—Common lead 6.35; corroding lead 6.45; chemical lead 6.45; copperized lead 6.40 when made from common lead, 6.50 when made from corroding lead. Ingots or Special Shapes—⅛-cent higher for each grade. New York prices 15 points above St. Louis; Chicago district 5 points; Detroit, Philadelphia, Cleveland-Akron 15; Pittsburgh, Connecticut, Boston, Springfield, Worcester 20.

No. 70—Scrap and secondary lead, effective Jan. 15, 1942. Maximum scrap prices f.o.b. point of shipment are determined by deducting from the maximum prices for common lead at various basing points the following: .55c for soft, hard and cable lead scrap and .65c for battery lugs and lead content of lead covered copper cable. Maximum secondary prices f.o.b. point of shipment, carlots, determined by applying following differentials to basing points for common primary pig lead: Low grade pig (minus 99.73%) deduct .15c; low grade ingots, linked ingots, other special shapes add .10c; high grade (99.73% plus), base price; high grade ingots, linked ingots, other special shapes, add .50c. Amendment, March 31, 1942, raises antimonial lead price 1½ cents per pound of contained antimony. Revises method of computing maximum prices for battery lead plates by requiring assay for only lead and antimony content.

No. 71—Cadmium, effective Jan. 19, 1942. Maximum prices for primary and secondary metallic cadmium per pound delivered are 95c for anodes, balls, discs and other special or patented shapes, 90c for bars, ingots, pencils, pigs, plates, rods, slabs, sticks and other regular straight or flat forms.

No. 72—Fuel oil (Bunker C and No. 6 grade), effective Jan. 9, 1942. Revoked March 26, 1942.

No. 73—Fish meal, effective Jan. 20, 1942.

No. 74—Animal product feedingstuffs, effective Jan. 20, 1942.

No. 75—Dead-Burned Grain Magnesite, effective Jan. 28, 1942. Maximum prices per ton, f.o.b. Chewelah, Wash., are $22 in bulk, $26 in bags or sacks. Westvaco Chlorine Products Corp. may charge regular California customers $10 higher from Patterson plant or stocks at Permanente. For export add $7.50 a net ton when packed in double jute sacks, $12.50 in wooden barrels.

No. 76—Hide Glue, effective Jan. 28, 1942.

No. 77—Beehive Furnace Coke, effective Jan. 26, 1942. Maximum for this grade produced in Pennsylvania $6 per net ton, f.o.b. cars ovens, Connellsville, Pa. Does not apply to foundry coke.

No. 78—Oxalic acid, effective Feb. 2, 1942. Maximum prices for carlots in cents per lb., f.o.b. producer's shipping point, for crystalline oxalic acid, 11¼ in containers of more than 290 lbs., 11¾ in containers of 100-290 lbs. Powdered acid 1 cent higher.

Amendment, March 31, 1942, exempts reagent grade from schedule provisions.

No. 79—Carbon tetrachloride, effective Feb. 2, 1942.

No. 80—Lithopone, effective Feb. 2, 1942. Maximum prices cents per lb. delivered in bags in carlots in New Mexico, Colorado, Wyoming, Montana and eastern states: Normal 4.25; high strength barium, calcium 5.60; high strength magnesium 5.75; titanated 5.60; zinc sulphide 8.25. Add ¼-cent for less carlots. Prices other states ¼-cent above eastern territory. Amendment Feb. 27, 1942, permits non-manufacturing dealers and exporters to fill, at higher than ceiling prices, contracts made prior to Feb. 2, 1942. Affects only lithopone on hand or in transit Feb. 2. Detailed reports on such deliveries must be furnished OPA within ten days.

No. 81—Primary Zinc, effective Jan. 29, 1942. Maximum carload prices in cents per lb., f.o.b. E. St. Louis, Ill.; Prime western 8.25; selected 8.35; brass special 8.50; intermediate 8.75. High grade and special high grade are 9.25, delivered. Producers may add 0.15c for 20,000 pounds to carlots, 0.25c for 10,000-20,000 pounds, 0.40c for 2000-10,000 pounds, 0.50c for less than 2000 pounds. Other sellers may add 0.65c, 0.75c, 1.00c and 1.50c for respective quantities.

Amendment, March 13, 1942, requires producers to file with OPA copy of all toll agreements; smelters must file agreements involving zinc made to other than listed specifications which are revised in the amendment.

No. 82—Wire, Cable and Accessories, effective Jan. 29, 1942. Includes hot rolled black or cleaned rods for electrical uses, and copper, copperclad or copper alloy wire used for conducting electricity. Maximum prices are manufacturers' net prices on Oct. 15, 1941. Weatherproof wire prices figured against base price of 17.5 cents. For material containing lead, add number of pounds of lead times $0.00325.

No. 83—Radio Receivers and Phonographs, effective Feb. 9, 1942. Manufacturers' maximum prices are highest net prices received Oct. 15, 1941, or in preceding three-month period. OPA must approve prices for models offered after Oct. 15.

No. 84—Parts for Radio Receivers and Phonographs, effective Feb. 9, 1942. Manufacturers' maximum prices are highest net prices received Oct. 15, 1941, or in preceding three-month period.

No. 85—New Passenger Automobiles, effective Feb. 2, 1942. Maximum wholesale prices are highest prices prevailing Oct. 1 to Oct. 15, 1941 (Feb. 2 prices for Packard and Crosley) plus lower of $15 or 1% of list price for each lapsed month after Jan. 31, 1942. Add taxes and fixed delivery charges for retail prices.

No. 86—Domestic Washing Machines, Ironing Machines, effective Feb. 9, 1942. Manufacturers' maximum prices are highest prices quoted Oct. 1-Oct. 15, 1941 (Feb. 2, 1942 prices for Apex Electrical Mfg. Co.). OPA must approve prices for models offered after Oct. 15.

No. 87—Scrap Rubber, effective Feb. 5, 1942. Maximum prices fixed at seven reclaiming centers, including geographical differentials. Ceiling at Akron, O., for beadless auto and truck tires $24 per net ton. Red passenger car inner tubes east of Rockies 7½ cents per pound.

No. 88—Petroleum and Petroleum Products, effective Feb. 2, 1942. Maximum prices are those posted for crude petroleum and the lowest quoted for petroleum products on Oct. 1, 1941. Amendment, March 25, 1942, raises Pennsylvania crude 25 cents per barrel. Amendment March 26, 1942, raises gasoline ½c per gallon, distillate fuel oils 0.4c per gallon, residual fuel oils 20c per barrel in New England states, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North and South Carolina, Georgia, Florida (east of Apalachicola river) and District of Columbia.

No. 89—Bed Linens, effective Feb. 2, 1942.

No. 90—Rayon Waste, effective Feb. 3, 1942.

No. 91—Tea, effective Feb. 3, 1942.

No. 92—Soy Bean and Peanut Oils, effective Feb. 4, 1942.

No. 93—Mercury, effective Feb. 4, 1942. Prime virgin mercury produced in California, Oregon, Washington, Idaho, Utah, Nevada or Arizona, $191 per 76-pound flask. When produced in Texas or Arkansas, $193. When imported from Mexico, $193, f.o.b. United States freight station nearest point of entry, including duty. Other imports $191, f.o.b. port of entry. Agent's selling commission limited to 1% of maximum price. Amendment, effective Feb. 10, 1942, permits dealers with stocks on hand or in transit Feb. 4 to deliver such stocks until March 2, 1942, at prices necessary to meet contracts made prior to Feb. 4. Verified statement of such transactions must be filed with OPA.

Amended March 17, 1942, to permit dealers to split with another dealer or broker the 2 per cent premium allowed.

No. 94—Western Pine Lumber, effective Feb. 15, 1942. Maximum prices generally are those prevailing during period Oct. 1-15, 1941.

No. 95—Nylon Hose, effective Feb. 5, 1942.

No. 96—Domestic Fuel Oil Storage Tanks, effective Feb. 20, 1942. Typical prices for carload shipment of 26-inch, 16-gage steel, 275-gallon capacity tank are $17.35 in the East, $17.70 in Midwest, $31.95 in the Far West.

No. 97—Southern Hardwood Lumber, effective Feb. 20, 1942. Cuts prices $2 to $5 a thousand feet from previous levels.

No. 98—Titanium Pigments, effective March 1, 1942. Prices are those prevailing Oct. 1, 1941. Regular grade, 20 tons or more, delivered in bags in eastern territory, 14½c per pound. Deliveries in western territory ¼-cent higher.

Amended March 1, 1942, to permit American Zirconium Corp., Baltimore, to exceed maximum prices by 1.5-cents per pound until May 2, 1942.

No. 99—Acetyl Salicylic Acid (aspirin), effective Feb. 16, 1942.

No. 100—Cast Iron Soil Pipe and Fittings, effective Feb. 20, 1942. Prices established in terms of minimum discounts from standard revised price list. Minimum discount for 2-6 inch extra heavy pipe 52½-10-10 for carload shipments by rail or 10-ton or greater shipment by truck, 52½ for less-carload by rail or less than 10 tons by truck. Amendment, March 7, 1942, permits warehouse sellers to compute delivery charges by method employed Oct. 1, 1941.

Amendment, March 31, 1942, permits producers to compute delivered prices on emergency shipments of less than 250 pounds in same manner as warehouse shipments are determined.

No. 101—Citric Acid, effective Feb. 16, 1942.

No. 102—Household Mechanical Refrigerators, effective Feb. 9, 1942. Maximum prices for manufacturers whose 1942 model prices were approved by OPA are net prices in effect Feb. 2, 1942. Prices of all new models must be approved by OPA.

No. 103—Salicylic acid, effective Feb. 16, 1942.

No. 104—Vitamin C, effective Feb. 16, 1942.

No. 105—Gears, Pinions, Sprockets, Speed Reducers, effective Feb. 18, 1942. Maximum prices are those in effect Oct. 15, 1941. Prices of special items not made before are to be computed on basis of Oct. 15 labor and material costs, using price-setting method employed on that date. Manufacturers whose 1941 sales were $5000 or more required to report by 10th of each month to OPA on preceding month's sales.

No. 106—Domestic Shorn Wool, effective Feb. 28, 1942.

No. 107: Used Tires and Tubes, effective March 16, 1942. Establishes maximum retail prices varying with amount of remaining tread. Typical prices; 4-ply passenger 6.00 x 16, $1.50 to $8.10; 6.50 x 16, $1.50 to $9.85; 10-ply truck 8.25 x 15, $7.20 to $37.70; 9.00 x 18, $12 to $42.95.

No. 108—Nitrogen Fertilizing Materials, effective March 23, 1942.

No. 109—Aircraft Spruce, effective April 1, 1942. Maximum prices vary up to $690 per 1000 board feet, plus extras when the lumber is kiln dried.

No. 110—Household Mechanical Refrigerators (Resale), effective March 30, 1942. Ceilings are manufacturers' recommended retail price lists. Margins of wholesale distributors limited to Oct. 1-15, 1941, levels.

No. 111—Household Vacuum Cleaners (Resale), effective March 30, 1942. Ceilings are manufacturers' recommended retail price lists. Margins of wholesale distributors limited to Oct. 1-15, 1941, levels.

No. 112—Anthracite Coal, effective April 1, 1942. Freezes prices at Oct. 1-15, 1941 levels.

No. 113—Iron ore, effective April 10, 1942. Applies to ore produced in Minnesota, Wisconsin and Michigan. Maximums are weighted average spot prices, based on Lower Lake ports delivery, at which spot sales of such ore were made during 1941 shipping season. "Escalator" clause eliminated from unexpired contracts. Maximum for ore shipped from mine idle in 1940 and 1941 is equivalent of $4.45 per gross ton, Lower Lake ports, for Mesabi Nonbessemer 51.50% iron, adjusted for grade and analysis. Base prices on other grades: Mesabi Bessemer $4.60; Old Range Nonbessemer $4.60; Old Range Bessemer $4.75; High Phosphorus $4.35. Penalties for silica and fine structure and premium for lump ore for open hearth use are those prevailing in 1941. Producers must report by 10th of month on preceding month's production and sales.

Additional copies of this special section on Priorities, Allocations and prices may be obtained by regular subscribers by addressing STEEL, Readers Service Department, Penton Building, Cleveland, O.

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Executive Officer: T. K. Tindale

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Minneapolis, Midland Bank Building

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Philadelphia, Broad St. Station Bldg.

San Francisco, 705 Newhall Building
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Price Executive: Norman Buchanan

CONTRACT FIELD OFFICES

Field offices of Bureau of Field Operations, Division of Industry Operations, War Production Board, are listed below. These offices provide information and engineering assistance to producers of war *materiel*. Manufacturers seeking war work should take or send to the nearest field office full information regarding their equipment and the products they normally manufacture. Regional offices established in 13 cities will administer activities of the various branch offices.

REGIONAL OFFICES

ATLANTA, with jurisdiction over Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Florida. Regional director to be appointed.

BOSTON, with jurisdiction over Massachusetts, Connecticut, Rhode Island, Vermont, New Hampshire, Maine. Regional director to be appointed.

CHICAGO, with jurisdiction over Illinois, Indiana, Iowa, southern Wisconsin. Regional director to be appointed.

CLEVELAND, with jurisdiction over Ohio (except Toledo area), Kentucky, West Virginia, western tip of Maryland, western Pennsylvania (including Pittsburgh, Johnstown and Erie). Regional Director, John C. Virden, Union Commerce building, Cleveland, Telephone: Cherry 7900.

DALLAS, with jurisdiction over Texas, Louisiana, Oklahoma. Regional director to be appointed.

DENVER, with jurisdiction over Colorado, New Mexico, Utah, Wyoming. Regional director to be appointed.

DETROIT, with jurisdiction over Lower Peninsula of Michigan and Toledo area in Ohio. Regional Director, Ernest Kanzler, 800 Boulevard building, Detroit, Telephone: Trinity 1-5500.

KANSAS CITY, with jurisdiction over Missouri, Arkansas, Kansas, Nebraska. Regional director to be appointed.

MINNEAPOLIS, with jurisdiction over Minnesota, North Dakota, South Dakota, northern Wisconsin, Upper Peninsula of Michigan. Regional director to be appointed.

NEW YORK, with jurisdiction over New York and portion of New Jersey north of Trenton. Regional director to be appointed.

PHILADELPHIA, with jurisdiction over Pennsylvania (except portion in Cleveland region), Delaware, Virginia, New Jersey (south of and including Trenton), Maryland (except western tip). Regional Director, Orville H. Bullitt, Broad St. Station building, Philadelphia, Telephone: Walnut 5900.

SAN FRANCISCO, with jurisdiction over California, Arizona, Nevada. Regional director to be appointed.

SEATTLE, with jurisdiction over Washington, Oregon, Idaho, Montana. Regional director to be appointed.

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Arizona
Phoenix, Security Bldg.

Arkansas
Fort Smith, 13 North Seventh St.
Little Rock, Rector Bldg.

California
Fresno, Mattei Bldg.
Los Angeles, 1031 South Broadway
Oakland, Financial Center Bldg.
Sacramento, Farmer's & Mechanic's Bldg.
San Diego, Union Bldg.
San Francisco, Furniture Mart

Colorado
Denver, U. S. National Bank Bldg.

Connecticut
Hartford, Phoenix Bank Bldg.
Bridgeport, Medical Bldg.
New Haven, Liberty Bldg.

Delaware
Wilmington, Penn Bldg.

Florida
Jacksonville, Lynch Bldg.
Miami, Congress Bldg.
Tampa, Wallace South Bldg.

Georgia
Atlanta, Hurt Bldg.

Idaho
Boise, Capital Securities Bldg.

Illinois
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Decatur, Standard Office Bldg.
Peoria, Alliance Bldg.
Springfield, Leland Office Bldg.

Indiana
Indianapolis, Circle Tower Bldg.
Evansville, Koenig Bldg.
Ft. Wayne, Utility Bldg.
South Bend, 206 City National Bank Bldg.

Iowa
Des Moines, Crocker Bldg.

Kansas
Wichita, Union National Bank Bldg.

Kentucky
Louisville, Todd Bldg.

Louisiana
New Orleans, Canal Bldg.
Shreveport, Giddens Land Bldg.

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Portland, Congress Bldg.

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Fall River, 27 South Main St.
Lowell, 8 Merrimac St.
Springfield, 95 State St.
Worcester, State Mutual Bldg.

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Grand Rapids, 1004 National Bank Bldg.
Iron Mountain, Commercial National Bank Bldg.

Minnesota
Minneapolis, Midland Bldg.
Duluth, 416 Federal Bldg.

Mississippi
Jackson, Tower Bldg.

Missouri
St. Louis, Paul Brown Bldg.
Kansas City, Mutual Bldg.

Montana
Helena, 222 Power Block Annex

Nebraska
Omaha, Grain Exchange Bldg.

Nevada
Reno, Saviers Bldg.

New Hampshire
Manchester, Amoskeag Industries Bldg.

New Jersey
Camden, 300 Broadway
Newark, Globe Bldg.
Trenton, 32 East Hanover St.

New Mexico
Alburquerque, 103½ West Central Ave.

New York
New York, Chanin Bldg.
Albany, Standard Bldg.
Brooklyn, 16 Court St.
Buffalo, Manufacturers' & Traders' Bank Bldg.
Rochester, 119 East Main St.
Syracuse, Starrett-Syracuse Bldg.
Utica, First National Bank Bldg.

North Carolina
Charlotte, New Liberty Life Bldg.
Raleigh, State Office Bldg.

North Dakota
Bismarck, First National Bank Bldg.

Ohio
Canton, Commercial Bldg.
Cleveland, Union Commerce Bldg.
Cincinnati, Union Trust Bldg.
Columbus, Spahr Bldg.
Dayton, Third National Bank Bldg.
Toledo, 833 Security Bank Bldg.
Youngstown, Union National Bank Bldg.

Oklahoma
Oklahoma City, Key Bldg.
Tulsa, Kennedy Bldg.

Oregon
Portland, Bedell Bldg.

Pennsylvania
Philadelphia, Broad St. Station Bldg.
Allentown, 506 Hamilton St.
Chester, 12-14 East Fifth St.
Erie, Erie Trust Company Bldg.
Harrisburg, Doehne Bldg.
Johnstown, U. S. National Bank Bldg.
Lancaster, Woolworth Bldg.
Norristown, Norristown-Penn Trust Bldg.
Pittsburgh, Fulton Bldg.
Reading, 615 Penn St.
Scranton, First National Bank Bldg.
Wilkes-Barre, 53 West Market St.
Williamsport, Susquehanna Trust Co. Bldg
York, Manufacturer's Association Bldg.

Rhode Island
Providence, Industrial Trust Bldg.

South Carolina
Columbia, Manson Bldg.

South Dakota
Sioux Falls, Boyce Greely Bldg.

Tennessee
Memphis, Sterick Bldg.
Chattanooga, James Bldg.
Knoxville, Goode Bldg.
Nashville, Stahlman Bldg.

Texas
Dallas, Fidelity Bldg.
El Paso, El Paso National Bldg.
Houston, Electric Bldg.
San Antonio, Majestic Bldg.

Utah
Salt Lake City, 306 David Keith Bldg.

Vermont
Montpelier, 12 State St.

Virginia
Richmond, Johnson Publishing Bldg.
Norfolk, Dickson Bldg.
Roanoke, 118 Kirk Ave.

Washington
Seattle, 239 Henry Bldg.
Spokane, Old National Bank Bldg.

West Virginia
Charleston, Capital and Quarrier Sts.
Clarksburg, Empire Bldg.
Huntington, West Virginia Bldg.
Wheeling, 1025 Main St.

Wisconsin
Appleton, 341 West College Ave.
Madison, Washington Bldg.
Milwaukee, Plankinton Bldg.
Eau Claire, 128½ Graham Ave.
Wausau, 404 Third St.

Wyoming
Casper, Box 1211

PRIORITIES FIELD SERVICE

The following district managers, who report to the Bureau of Field Operations, Division of Industry Operations, War Production Board, serve in an advisory capacity in priorities. Chief function is to assist holders of war and essential civilian contracts to obtain priority ratings on materials.

Atlanta, Ga.—John B. Reeves, 150 Hurt Bldg.

Baltimore—Theodore M. Chandlee, Baltimore Trust Bldg.

Birmingham—M. J. Lide, Phoenix Bldg.

Boston—Donald T. Hood, 17 Court St.

Buffalo—Paul R. Smith, M. & T. Bank Bldg.

Charlotte, N. C.—J. E. MacDougall, Liberty Life Bldg.

Chicago—Malcolm R. Macdonald, 20 North Wacker Dr.

Cincinnati—Elmer C. Henlein, 34 East Fourth St.

Cleveland—G. A. Moore, Union Commerce Bldg.

Dallas, Tex.—John B. Joyce, Fidelity Bldg.

Dayton, O.—Harold B. Doty, Third National Bank Bldg.

Denver—Virgil Board, U. S. National Bank Bldg.

Detroit—James E. Wilson, Boulevard Bldg.

El Paso, Tex.—R. C. Stryker, El Paso National Bank Bldg.

Hartford, Conn.—Edwin L. Howard, 11 Asylum St.

Helena, Mont.—Oscar A. Baarson, Power Block House.

Houston, Tex.—George L. Noble, Jr., Electric Bldg.

Indianapolis, Ind.—Albert O. Evans, Circle Tower Bldg.

Jacksonville, Fla.—George H. Andrews, Lynch Bldg.

Kansas City, Mo.—C. B. Shaeffer, Federal Reserve Bank Bldg.

Knoxville, Tenn.—Dyer Butterfield, Goode Bldg.

Little Rock, Ark.—C. S. Christian, Rector Office Bldg.

Los Angeles—A. R. Thomas, Western Pacific Bldg.

Louisville, Ky.—James T. Howington, Todd Bldg.

Memphis, Tenn.—J. S. Bronson, Sterick Bldg.

Milwaukee—Frank J. Tharinger, Plankinton Bldg.

Minneapolis—Willard F. Kiesner, Midland Bank Bldg.

Nashville, Tenn.—George S. Gillen, 1015 Stohlman Bldg.

New Orleans—John A. Bechtold, 422 Canal Bldg.

New York—Sydney Hogerton, 122 E. Forty-Second St.

Oklahoma City, Okla.—C. F. Aurand, 414 Key Bldg.

Omaha—H. C. Williams, Grain Exchange Bldg.

Philadelphia—Frederick W. Slack, Broad St. Station Bldg.

Phoenix, Ariz.—L. G. Brennan, Security Bldg.

Pittsburgh—Charles C. Cruciger, Fulton Bldg.

Portland, Oreg.—J. Fred Bergesch, Bedell Bldg.

Richmond, Va.—Fred P. Wilmer, 10 South Fifth St.

Salt Lake City, Utah—Ralph E. Bristol, Utah Oil Bldg.

San Antonio, Tex.—Carl L. Pool, 415 W. French Place.

San Francisco—James A. Folger, 1355 Market St.

Seattle, Wash.—William D. Shannon, Henry Bldg.

St. Louis—W. H. Goodloe, 314 North Broadway

Tampa, Fla.—H. E. Brennan, Wallace South Bldg.

Tulsa, Okla.—A. E. Ballin, Kennedy Bldg.